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PREVALENCE OF PELLAGRA



ARTICLE REPRINTED FROM THE JOURNAL OF THE
SOUTH CAROLINA MEDICAL ASSOCIATION

By J. W. BABCOCK, M. D.

AND

CONSULAR REPORT ON THE PREVALENCE OF PELLAGRA
IN ITALY AND SOUTHERN EUROPE

By VICE CONSUL W. BAYARD CUTTING, JR.



PRESENTED BY MR. TILLMAN

DECEMBER 14, 1910.—Referred to the Committee on Printing

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December 14, 1810.

Ordered, That the manuscript entitled "The Prevalence of Pel-
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Attest:

CHARLES G. BENNETT, *Secretary*.

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TABLE OF CONTENTS.

	Page.
Pellagra in the United States	5
Pellagra in Italy	13
Description of the disease	17
Causes of the disease	18
Corn and pellagra	21
Remedies, curative and prophylactic:	
Italy's fight against pellagra	24
Curative measures	26
Preventive measures	28
General conclusions on prevention	32
Reports on existing conditions of the disease in districts personally visited:	
Novara	34
Sondrio	34
Como	34
Milan	35
Pavia	36
Bergamo	36
Brescia	37
Cremona and Piacenza	38
Present state of Italy in relation to pellagra	38
Table 1. New cases reported	41
Table 2. Deaths from pellagra	43
List of annexes	44
Appendix No. 1, law of July 21, 1902, for the prevention and cure of pellagra	46
Appendix No. 2, regulations for the execution of the law of July 21, 1902.	47

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PREVALENCE OF PELLAGRA IN THE UNITED STATES,

BY

J. W. BABCOCK, M. D.,
OF COLUMBIA, S. C.

THE PREVALENCE OF PELLAGRA IN THE UNITED STATES,¹

By J. W. BABCOCK, Physician and Superintendent, State Hospital
for the Insane, Columbia, S. C.

[Reprint from the Journal of the South Carolina Medical Association, September, 1910. Pp. 445-449.]

At the last meeting of this association a collaborated report² was presented upon the known and estimated statistics of pellagra in this country. At the request of your committee on program, I renew and amplify the topic to-day. Unfortunately, I must still speak from the asylum point of view, reliable statistics from the general population not yet being available from many States.

PREVALENCE.

In the previous paper it was stated that 1,000 cases of pellagra had been reported from thirteen States, more than half being in insane asylums and similar institutions. These cases were, for the most part, in the South Atlantic and Gulf States, and a conservative estimate was given of the occurrence of 1,500 cases in the Southern States in the three preceding years. When our manuscript went to press in the early fall the number of States in which pellagra had been reported had reached 16, 2 interesting foci of the disease having been discovered in Illinois in July and August at the Cook County and Bartonville hospitals, respectively.

In December, 1909, records were at hand of the existence of pellagra in 26 States. A few cases of the disease had been diagnosed or suspected in Massachusetts, New York, New Jersey, Pennsylvania, Maryland, Oklahoma, Arkansas, Kentucky, Iowa, Kansas, California, Ohio, New Mexico, and Colorado. Some of these were "imported," while in the following States pellagra had been recognized as present in more formidable proportions among natives and residents, more especially in insane asylums: Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Tennessee, and Illinois. To these we may now add Vermont and Missouri.

Since this paper was read, single cases of pellagra have been reported from Rhode Island, West Virginia, and the District of Columbia; and record may now be entered of the discovery of another interesting focus of the disease recently made at the Philadelphia Hospital for the Insane ("Blockley").

¹ Read before Am. Med. Psycholog. Assoc., Washington, D. C., May, 5, 1910.

² Lavinder, C. H.; Williams, C. F., and Babcock, J. W., Trans. Am. Medico-Psycholog. Asso. XVI, 283; also Pub. Health Reports, Wash., 1909, XVI, 25, 849; also Jour. S. C. Med. Asso., 1909, V. 351; also Reprints.

PREVALENCE OF PELLAGRA

Pellagra in the United States

Alabama	3
Arkansas	3
California	1
Colorado	33
Connecticut	7
Delaware	100-300
District of Columbia	200
Florida	500
Georgia	670
Idaho	50
Illinois	330
Indiana	188
Iowa	500 (?)
Kansas	100
Kentucky	1
Louisiana	1
Maine	51
Massachusetts	5
Michigan	250
Minnesota	2
Mississippi	2
Missouri	7
Montana	1 (?)
Nebraska	1
Nevada	2
New Hampshire	1 (?)
New Jersey	3
New Mexico	1
New York	1
North Carolina	1
North Dakota	1
Ohio	1
Oklahoma	1
Oregon	1
Rhode Island	1
South Carolina	1
South Dakota	1
Tennessee	1
Texas	1
Vermont	1
Virginia	1
Washington	1
West Virginia	1
Wisconsin	1
Wyoming	1

Small-scale reports of cases of pellagra have been made from Wisconsin, Washington, Michigan, and Oregon.

This table indicates that pellagra exists, or is suspected, in 34 States and the District of Columbia, and that the number of cases approximates 5,000. Some of the figures are based upon actual cases and others upon general estimates. While some estimates seem large, nearly all are made by health officers, or physicians, who have had experience with both statistics and pellagra, so that upon the whole the sum total may, as was claimed for the estimates last year, be considered as conservative. That 5,000 cases of pellagra have occurred in the United States in the last five years is probably true.

North Carolina.—There is satisfactory proof that at least one case of pellagra occurred in this State as far back as 1889. There are definite records of 200 cases in North Carolina. It is difficult to estimate how many cases occurred in the State as a whole. It is certain that only a small portion have been recognized. It is no wonder, therefore, that in running down one case, four or five more are found.

Statistics for N. T. Searcy.—Pellagra statistics in asylums up to 1900.

Alabama	6
Arkansas	21
California	27
Colorado	18

Mount Vernon (colored) Hospital since 1896:

Negro men.....	66
Negro women.....	144
Total.....	216
Deaths.....	121
Average number of white patients.....	1,350
Average number of colored patients.....	650

A press report based upon records of the Alabama Board of Health states: Fifty-five persons (21 white and 34 negroes) died of pellagra from January 1, 1909, to October 1, 1909, and 38 cases were still under observation.

South Carolina.—The disease has been recognized in Charleston since March, 1908, but it is a very general opinion among the local physicians there that pellagra has existed in that city for 20 years or more under other diagnoses. Nineteen cases—white males, 6; colored males, 3; colored females, 10—have been recognized. Ten have died. The death rate in insane cases was especially high.¹

I will pass among you two maps, showing the local origin of 137 cases of pellagra admitted to the South Carolina State Hospital from January 1, 1908, to November 1, 1909 (about 12 per cent of the total admissions). In the State Hospital last year out of 605 admissions, 92, or 15 per cent, had pellagra on admission, and there were 68 deaths from the disease. The other map is based upon reports to the secretary of the State board of health from physicians upon pellagra throughout the State.

The most striking feature about these two maps is the greater prevalence of the disease, just as has been suspected, above the "fall line," or in the upper part of the State.

Louisiana.—The number of cases of pellagra in the State positively diagnosed is about 75, of which 85 per cent are in State institutions.²

Vermont.—A press dispatch under date of April 17, 1910, reports what is said to be the first case of pellagra in Vermont, in a woman, at the Fanny Allen Hospital, at Burlington.

Pennsylvania.—Passed Assistant Surgeon John D. Long, United States Public Health and Marine-Hospital Service, tells me that about June 1, 1910, in consultation with the medical officers of the Philadelphia Hospital for the Insane ("Blockley") he saw in that institution 9 cases of pellagra and 16 suspects.

Rhode Island.—A dispatch dated July 12 announces the death at the State almshouse at Providence of the first case of pellagra in the State, a man 55 years old.

Cuba.—It has been taken for granted that pellagra does not exist in Cuba, but Dr. Manuel Bango says very rarely cases have been imported from the Austrias, and occasionally a tentative diagnosis has been made in natives or residents, usually alcoholists or sufferers with sprue.³

Such are some of the current reports and comments about the prevalence of pellagra. They could easily be multiplied.

The general attitude of the American medical mind toward the possible existence of pellagra in this country is well illustrated by

¹ Sams, F. F., Pub. Health Repts., Nov., 1909.

² Quart. Bull. La. State Board of Health, I, 3.

³ Guiteras, J., Sanidad y Beneficia, Havana, 1909, II, 377.

the fact that one of our highest authorities on diagnosis a few years ago, while on a visit in South Carolina, after carefully studying a typical pellagrin, rendered the opinion to his equally puzzled fellow-consultants that it was a case of "glossitis." This incident may soothe our professional conscience somewhat, but it does not excuse us. I know now that I should have made the diagnosis of pellagra in South Carolina nearly 19 years ago. If pellagra and beriberi have admittedly occurred in our asylums, sporadically or endemically, shall we not learn a lesson therefrom and hereafter be on the alert for other so-called tropical diseases?

Neither the occasion nor space permit consideration of foreign statistics, however interesting and instructive they may be. But briefly, it may be noted that, according to the circular recently issued by the British pellagra investigation committee:

In certain countries within the Mediterranean regions, such as Spain, Italy, and Roumania, pellagra is looked upon as a veritable calamity. For Italy a yearly estimate of from 50,000 to 60,000 standing cases is no exaggeration; while Roumania, with a population of 5,300,000, is estimated to have from 40,000 to 50,000 cases.

When we recall that according to different authorities from 4 to 10 per cent of pellagrins become insane, we can understand the significance of these figures to alienists as well as to sanitarians and publicists.

The evidence is accumulating that pellagra has probably existed in this country since the "big war," at least Gray and Tyler went on record with reports of cases in 1864—and it is worth recalling that it was at a meeting of this association in this city—and there is reason to believe that the disease was prevalent at the same time in the Andersonville, Ga., prison. Dr. W. J. W. Kerr, of Corsicana, Tex., an assistant surgeon of the prison, is my authority for the statement. A former assistant physician in the South Carolina Asylum, Dr. H. N. Sloan, says the disease was recognized and called pellagra there in the early seventies, but I have found no printed or written record of it. Dr. J. L. Thompson, for many years assistant physician, as well as old attendants, in the same hospital, are now satisfied that they can trace the disease back to the early eighties. As stated above, Charleston physicians now admit the occurrence of pellagra in their city 20 years or more ago. In addition to the early cases mentioned in the paper last year, I have learned from Dr. C. C. Bass that Dr. Bemis, of New Orleans, left a written diagnosis of a case in the Charity Hospital in 1889. Dr. Isadore Dyer, of New Orleans, had a case diagnosed as pellagra, and referred to him for treatment by an Alabama physician six months before Dr. G. H. Searcy observed the disease. So we may conclude that isolated cases of pellagra, native and imported, have probably occurred in general practice, and especially in asylums and hospitals, for the last half-century, although the diagnosis may not always have been correctly made. But after granting the occurrence of sporadic cases for a long time we must admit that we are now passing through a serious epidemic of pellagra.

A phase of the psychology of the problem has been the failure of the profession to recognize pellagra, if it has heretofore been prevalent in anything like its present proportions. The explanation of, or the responsibility for this oversight, rests largely with the authors of English and American textbooks, of both general practice and *insanity*, who have told us, if they told us anything at all about it,

that pellagra is an Italian disease that does not occur in our country.¹ But in 1882 Van Harlingen² announced that the disease was likely to occur in the United States at any time.

So careful an authority as Surg. Rupert Blue, of the United States Public Health and Marine-Hospital Service, states that he is of the opinion that pellagra can be found to-day in nearly all of the insane asylums and almshouses of this country.³

This statement is probably too sweeping, but it serves to indicate how important it is that accurate statistics should be secured at an early date.

It is my impression that the discovery of the existence of pellagra in their institutions is not welcomed by some asylum officers. Recently while visiting such a hospital in which the disease had not yet been recognized, I saw and called attention to an unmistakable case, but I was not invited to extend my observations.

Less than two and one-half years ago pellagra was but a shadow of a name to most of us. The increasing number of States reporting the disease and the figures quoted above, indicate, to some extent, how common in some communities as well as how widely disseminated the disease is, and probably has been for some years, in the United States. By asylum officers—shall I say in the South only?—pellagra is now becoming recognized as of great importance as a cause of insanity.

It is to emphasize the above facts that I have, after hesitation, undertaken, on rather short notice, again to present the topic of pellagra before you.

Conclusions.—It is now established that pellagra in the United States extends from the Atlantic to the Pacific, and from the Great Lakes to the Gulf of Mexico. The disease is, therefore, no longer merely of academic interest to the American physician, be he alienist or neurologist, dermatologist or general practitioner.

It is probable that pellagra has occurred sporadically in this country for 40 or 50 years, but it is certain that for the last three or four years it has appeared in epidemic form.

Numerically its prevalence can not be accurately or even approximately stated, but its wide geographical distribution emphasizes the need of vigorous, intelligent investigation into its causation, prevention and treatment on the part not only of the medical profession, but also by both State and Federal Governments.

¹ Spitzka, E. C., "Insanity," N. Y., 1883, 124.

² Van Harlingen, A., "Dis. of the Skin," 1882.

³ Blue, R., Cal. State Jour. of Med., 1910, 101.

NOTE.—Grateful acknowledgment is made to officers of the United States Public Health and Marine-Hospital Service and to assistants in the library, Surgeon General's Office, Army Medical Museum, Washington, D. C., for many courtesies and valuable aid while preparing this paper.

PELLAGRA IN ITALY,

BY

MR. W. BAYARD CUTTING, JR.,
VICE CONSUL AT MILAN.

DEPARTMENT OF STATE,
Washington, December 22, 1908.

SIR: At the request of the American consul at Milan, Italy, I inclose herewith a report on the subject of pellagra in Italy, made by Mr. W. Bayard Cutting, jr., the American vice consul at Milan, November 2, 1908.

I am, sir, your obedient servant,
For the Secretary of State:

W. J. CARR, *Chief Clerk.*

DR. J. W. BABCOCK,
*Superintendent State Hospital for the Insane,
Columbia, S. C.*

AMERICAN CONSULATE,
Milan, Italy, November 2, 1908.

SIR: I have the honor to forward in triplicate a report prepared by Vice Consul W. Bayard Cutting, jr., on pellagra in Italy.

This report was undertaken at the request of Senator Benjamin R. Tillman, United States Senate, Washington, D. C., and Dr. J. W. Babcock, State Hospital for the Insane, Columbia, S. C., and I beg that copies thereof be forwarded to each of these gentlemen.

In forwarding this report, with a special commendation for its thoroughness, I beg leave respectfully to ask that the department consider the propriety of issuing a commendation to Mr. Cutting should its examination of his work justify such action in its opinion. I have the honor to be, sir,

Your obedient servant,

JAMES E. DUNNING,
Consul of the United States.

THE ASSISTANT SECRETARY OF STATE,
Washington, D. C.

PELLAGRA IN ITALY.

Consul James E. Dunning, of Milan, forwards the following report made by Vice-Consul W. Bayard Cutting, jr., on pellagra in Italy:

For 170 years, and more, a disease known as pellagra has afflicted southern Europe and in particular Italy. It is a disease of peasants, limited to agricultural populations. In 1735 it was observed in Spain; in 1762 (1740?) in Italy; and in 1829 (1818?) in France. Southern Austria and the Balkan States still feel its ravages. Lately it was discovered in Egypt; and now its existence has been proved in North and South Carolina and in other States of the American Union.

Pellagra is generally recognized as a form of poison. Thus its symptoms vary greatly with the individual sufferer, and the disease itself is hard to diagnose. The pellagra poison, like many others, may give one effect if taken in a small dose, and a precisely opposite effect when the dose is increased. It follows that the disease is often confused with others; that symptoms are sometimes attributed to it which result from extraneous complications; and that its very existence, as an independent malady, has been not infrequently denied. Pellagra, it has been said, can be described as "des malades sans une maladie."

Two facts, however, would alone suffice to establish beyond question the independent nature of pellagra: the immense rapidity with which it spreads, and its close connection with the consumption of Indian corn. In 1770 pellagra was almost unknown in Italy; in 1839 Lombardy alone had over 20,000 cases of the disease, and in 1879 over 40,000. In 1881 the 9 regions of northern and central Italy (Piedmont, Lombardy, Liguria, Venetia, Emilia, Marches, Umbria, Tuscany, and Lazio), with a population of 16,689,735, contained 104,067 pellagrous patients. These figures, which include only the officially registered cases, would indicate one pellagrous patient for every 60 individuals in the agricultural population; and in some regions, like Venetia, one for every 19.

The spread of pellagra, so rapid within certain districts, was limited entirely to those regions where Indian corn formed the chief article of human food. This crop, which came originally from America, was introduced into Italy from the Balkan States of Turkey, and is known in Italian as *grano turco*. Its causal relation to pellagra was first clearly pointed out by Marzari in 1810; and since that day the zeists and antizeists have maintained opposite views on the subject. A brief summary of the main points of controversy can not be omitted from any report on the disease; but for the present it is enough to say that in Italy, at the present time, pellagra is found only among those who make Indian corn a principal element of their diet; and that the total or partial elimination of Indian corn is the surest way of eradicating the disease from a given community.

DESCRIPTION OF THE DISEASE.

The symptoms of pellagra fall into three main classes—cutaneous, digestive, and nervous and mental.

The most noticeable feature of the typical pellagrous patient is the red scaly eruption of his hands and feet. This is the characteristic which led the Spanish to call pellagra a form of leprosy, the Italians to identify it with the scorbutic maladies, and the French to mistake it for a skin disease caught from unclean sheep skins (*actinomy-cosis*). Usually the skin of the backs of the hands and feet, and of such portions of the neck and chest as are exposed to the air, become dry and red. Sometimes this simple hyperemia is the extent of the cutaneous affection; more often there is a swelling and peeling of the skin; on the corium is formed a scaly crust, beneath which the epidermis is renewed. The tongue and lips become red and dry. The extent of the dermatitis bears little relation to the severity of the disease; sometimes the worst cases have no more than a dry chronic erythema, of a dark red color, with imperceptibly slow desquamation. In point of time, dermatitis is usually supposed to be the first symptom to appear. More probably it is usually a late successor to digestive troubles, to which it first calls definite attention. Its importance is chiefly diagnostic; it has little actual effect on the course of the malady, and it disappears practically completely at those periods of the year when pellagra is least acute.

More important than the skin eruptions, because nearer the seat of the malady, are the digestive troubles which accompany pellagra. These usually take the form of severe diarrhea. Sometimes there is a prevalence of gastric, sometimes of intestinal disturbances. Dilatation of the stomach, pyroses, cardialgia, eructation, alternating diarrhea and constipation are symptoms frequently found. But the common case is that of progressively acute diarrhea, inaccessible to ordinary methods of cure. The diarrhea brings about emaciation and weakness, and gives to sufferers that particular cadaveric appearance which can never be forgotten by those who have seen it.

Sometimes at an early stage, but invariably after a certain time, pellagra affects the nerves, the motor reflexes, and finally the brain. Symptoms vary widely with different patients; the most common is perhaps the exaggerated excitability of the reflex motor centers. Bad nourishment induces a loss of muscular strength and a weakness of the lower limbs. Fits of giddiness are a frequent symptom; indeed, giddiness and an invincible lassitude are in many cases the first symptoms noticed by the sufferer. Then comes a condition of general psychic excitability, with prolonged fits of depression. Suicidal mania is very common, the patients often attempting to drown themselves. Finally the patient attains a condition of veritable dementia, of the melancholic variety; he has delusions of persecution, of extreme poverty, of plots against his life. He refuses food and drink, or else his mind is merely confused, and he awaits in a sort of stupor the paralysis or death which finally overtakes him.

Pellagra does not always result in mental disturbances. Probably less than 10 per cent of pellagra patients have their minds affected; and there are many peasants who have the disease for 15 or 20 years, and finally die of it, without any disturbance of their mental equilib-

rium. On the other hand, dementia is the normal outcome for severe cases, and it is sufficiently common to have caused the inhabitants of whole provinces to conceal pellagra at any cost, because to own up to the disease would be to brand oneself as a madman.

Pellagra is neither infectious nor contagious. It is transmissible, like insanity, in the form of a predisposition. It is periodic, the most acute outbreak being in the spring, with a minor outbreak in the autumn. These facts are established beyond all cavil. Is pellagra curable? Most authorities say yes; and the general methods adopted in regard to the disease assume its curability as a matter of course. But one high authority,¹ who has devoted his life to the disease, assures the writer that in his long experience he has seen only two complete cures of fully developed cases. If pellagra can not be entirely cured, however, it can be greatly mitigated. The extreme forms of the malady (and especially the pellagra-typhoid, which kills in a few weeks) can be averted by simple curative methods; and the pellagrous patient may hope, if he takes the proper dietary precautions, to live as long as other men and to do the same amount of work.

CAUSES OF THE DISEASE.

The question, What causes pellagra? may be answered from two points of view. If we ask a doctor, he will name what he conceives to be the poison or the microorganism which enters the human system; he will tell us how it springs into existence and under what conditions and will describe its effect upon the blood or upon the physiological processes of the recipient. This type of answer we may call the medical. On the other hand, if we are questioning a philanthropist or a legislator, he will omit such scientific data and will tell us that the cause of pellagra in a given district is the bad quality of the corn planted or the frauds committed by the millers or the dirty houses of the people. The doctor deals with the individual case; the economist with the community. The discovery of the cause will mean for the doctor the possibility of making cures; for the economist the possibility of preventing and extirpating the disease. And while the economist's conclusions depend ultimately upon the doctor's experiments, their practical validity is not limited by the doctor's uncertainties. While scientists dispute whether any corn, or only spoiled corn, can give pellagra, and whether in spoiled corn the source of infection is the *penicillium glaucum* or the *bacterium maidis*, the practical reformer can teach the peasants to grow only the best varieties of corn, to dry it properly, to keep it in sanitary storehouses, to cook it in a wholesome manner, and above all, not to consume it to the exclusion of other necessary forms of food.

This example may clarify the statement, now to be made, that the cause of pellagra, while scientifically uncertain, is practically, and for Italy, ascertained. When the scientific doubts are resolved we shall know just how wide an application the example of Italy has for other nations. The fact that they are not resolved, on the other hand, does not prevent us from profiting usefully by Italy's experience wherever there is a sufficient similarity of conditions.

¹ Dott. Cav. Giuseppe Friz, director of the Pellagrosario of Inzago, and author of many learned monographs on pellagra.

The writer is not in a position to discuss the medical controversy between the zeists and the antizeists. His main concern must be with the practical or economic aspects of the pellagra question. But an outline of the present state of scientific opinion is necessary in order to clear the ground for those questions upon which opinion is agreed.

The zeists are those who see in Indian corn the sole cause of pellagra. Their founder was Marzari. He attributed the bad effects of Indian corn to the lack of glutinous substance in the grain and thought that the exclusive consumption, during the whole winter, of any other nonglutinous vegetable would produce a similar result. The father of modern zeism is Balardini, whose report to the Italian Scientific Congress of 1844 laid the foundations for all subsequent discussion. He proclaimed that not corn *per se*, but spoiled corn, was the cause of pellagra, and pronounced the disease a form of intoxication or poisoning. The poison, according to Balardini, is due to a fungus or mold which develops on badly matured or badly kept corn. This is, in the main, the present belief of the zeist school, which is unable, however, to agree as to the precise fungus which forms the poison or as to the way in which the poison operates. The classic, and at the same time the extreme zeist, is Lombroso, whose first experiments were published in 1869 and who still defends stoutly, in print and in the public gatherings of "pellagrologists," every jot and tittle of his dogma.

According to Lombroso, there is no pellagra without corn; there is not, and there could not be. But corn in itself is absolutely harmless; a man could live 40 years on an exclusive corn diet without the slightest risk of developing symptoms of pellagra, provided the corn was sound. Unripe corn, however, or corn kept in a damp place, becomes moldy. The mold forms chiefly in the vicinity of the germ or kernel of each grain. From the mold a poisonous substance is formed in the corn—a poison which, when absorbed into the system, is the veritable and the unique cause of pellagra. The actual fungus which gives the poison is the *penicillium glaucum*, not, as Balardini had thought, the *sporisorium*. The *penicillium* forms on other kinds of grain besides corn; but in them it does not produce the pellagra poison; and it is not of itself toxic to the human system. Pellagra does not come directly from the penicillium, but from the *pellagrozeina* ("identical with strychnine," says Lombroso), formed in the corn as a result of the *penicillium's* action.

The doctrine is, in the present state of science, insusceptible of direct proof and of direct disproof. It can not be disproved for two reasons; first, because it is impossible to show that any given patient whose food was corn ate only healthy corn, whereas it is easy to demonstrate the presence in spoiled corn of a toxic substance. If the corn was well matured, it may have been badly kept, or if well kept it may have become spoiled after being ground into flour. The flour may have been sound, but have been cooked so badly as to allow decay in the *polenta* or corn bread. There is always a chance that a man who has eaten corn at all may have eaten spoiled corn. The second reason why the Lombrosian theory is hard to disprove is that cases of pellagrous patients who have never eaten corn are hard to find, and when they are found they can be dismissed

as examples of some other disease. The symptoms of pellagra are so varied, even in Italy, that they impinge frequently on those of other maladies. Every province, according to Lombroso, has its own peculiarities; *a fortiori*, we must add, every country. This variety of symptoms allows much latitude to the theorist; in perfect good faith he is able to include as examples of pellagra such cases as suit his preconceived ideas and to reject such as have a contrary tendency.

Pure zeism, as has been said, is no more capable of direct proof than of direct disproof. Experiments with the poison of spoiled corn have indeed induced serious, and even fatal, results on all kinds of animals, and on human beings; but they have not induced the precise disease, pellagra. Nor has it been conclusively shown that the poison enters into the human system ready made, and not in the form of a bacterium. And there are no established quantitative relations between the amount of poison absorbed and the progress of the disease. Prof. Ceresoli, for instance, experimented on himself for two months, eating every day a large dish of *polenta* made of the most moldy corn he could find. At the end of two months he had noticed no evil symptom of any kind. The poison had failed to operate; why? Probably because in addition to bad *polenta*, he had eaten good food of other kinds. There must also be a predisposing cause or a debilitating disease, such as typhoid fever, tuberculosis, syphilis, frequent childbearing, poverty, insanity, or other condition producing exhaustion or lessened powers of resistance. Pellagra appears most easily (if not exclusively) among those whose diet is corn, good or bad; or at least among those who live mainly on corn and other vegetable foods; and among such persons it is probable that a very small amount of *pellagrozeina*, as Lombroso calls the corn poison, is sufficient to induce the disease.

Accordingly, among the antizeists we meet first with those who call pellagra the disease, not of corn, but of poverty. The corn explanation appears to them not so much false as inadequate. It is true, perhaps, that little or no pellagra is found in places where corn is unknown; but such a concession to zeism appears to them purely formal. Look at the places where pellagra is found. In Spain, where it takes several forms, it appears in districts where corn is either not cultivated or constitutes only a small part of the peasant's diet.¹ In France, the inhabitants of the Landes used to eat corn, but other grains as well, and in far larger quantities. Even in Italy some of the largest corn-growing districts have the least pellagra, or none at all. If in answer to this the Lombrosian says that the districts in question are exempt precisely because their corn is good and does not become moldy, their opponents can point to regions where the crop is exceptionally fine, yet pellagra abundant; and to others, near by, where the corn is bad, and pellagra scarce. No kind of statistical curve can be drawn with corn statistics which has any definite correspondence with the pellagra curve—whether the area of cultivation, the amount of the crop, or its market price be taken as a basis. And then the antizeists point to huge corn-fed populations like those of Mexico, Poland, and—till to-day—the United States, where pellagra is entirely unknown. They do not deny that in Italy

¹ But Lombrosians do not admit that the *flema salada* of Aragon is a form of pellagra.

corn is a cause of pellagra; but the cause they find in the inadequate nutrition and poverty of the peasant, who is enfeebled during the long winter months by an inadequate vegetable diet, and whose debility takes a violent and specific form when the labor of the spring begins.

The poverty theory is almost too indefinite to criticize; it is itself little more than a criticism. Among more positive doctrines we may enumerate:

1. That which attributes pellagra to corn itself, not to spoiled corn. This explanation is inadequate. If corn is lacking in certain nutritive qualities—in gluten, in nitrogenous matter—so is rice, which, nevertheless, does not produce pellagra. If corn contains a poison, how can so many nations consume it with impunity?

2. That which admits spoiled corn as the cause, but thinks that the poison enters not as a toxine ready made, but as a bacterium (*bacterium maidis*).

3. Those which attribute the poison to other agencies than the *penicillia*—to the *aspergilli*, for instance, or to the *bacterium maidis*, or to a combination of these microorganisms.

4. Those which, while admitting the direct poisoning from corn as one cause of pellagra, attach considerable importance to other elements; heredity,¹ for instance, or the consumption of alcoholic liquors made from corn.

It is not the purpose of this report to judge between these conflicting theories. What may safely be said of them all is that for Italy, if not for other countries, they admit the consumption of corn, and especially of spoiled corn, as the cause of the disease. Other causes may possibly operate elsewhere; but in Italy it is corn that is at the root of the trouble. This the strongest antizeist admits to-day. And the most devoted zeist admits that any general raising of the standard of living, any improvement in nutrition and housing, tends to the eradication of the malady. Thus we are able to leave to scientists the final settlement of the biologic cause of the disease and to investigate, without considering their controversies, the social and economic conditions under which the disease spreads.²

CORN AND PELLAGRA.

It has been stated already that no direct connection is traceable between the amount of corn grown in a given locality and the amount of pellagra. Nor do those districts suffer the most where the corn grown is of the poorest quality. The real connection, it would appear, is between pellagra and (1) a practically exclusive corn diet, with (2) the consumption of a certain amount of corn that is spoiled or moldy.

Now there are three stages at which corn may spoil—as grain, as flour, and as cooked meal or bread. Each of these stages must be considered separately, because investigators are not agreed as to their relative importance.

¹ But for an opposite opinion see Strambio, junior, 499 ff. The nutritive value of corn is a matter upon which the widest diversity of opinion still exists.

The heredity hypothesis is based not merely upon observation, but upon experiments with the blood of pellagrous patients. See Antonini, Contributo allo Studio della Sieroterapia nella Pellagra, Bergamo, 1904, 11, and reference to Ceni's experiments.

² La Pellagra, i Pellagrosi e le Amministrazioni Pubbliche del Dott. Gaetano Strambio, junior.

Corn that is gathered before it is thoroughly ripe, or that does not ripen on account of adverse climatic conditions, becomes easily moldy. This happens to corn grown in mountainous regions, subject to early frosts, or in northern latitudes. In Italy it happens in particular to the corn known as *quarantino* or *cinquantino* (*z. m. praecox* and *z. m. subpraecox*). These are small grained varieties planted as a second crop in fields where wheat, or an earlier crop, has already been harvested. Ordinary corn is planted in March and ripens in August or early September. The *quarantino* is not planted till the end of June or the beginning of July, when it ripens in late October, the autumn rains have already arrived. It is harvested half ripe and soon decays. Human consumption of *quarantino* may be said to be invariably dangerous. An object lesson of its influence is given by the neighboring provinces of Piacenza and Cremona. Of the two provinces, Cremona is the richer and more fertile; its people have a higher standard of living; it has a greater diversity of industries. Climatically the two provinces stand on a level; geologically there is little difference between them. There is but one circumstance that differentiates these provinces from the point of view of the investigator of pellagra. In Cremona (especially in the vicinity of Crema) a large amount of *quarantino* corn is grown; in Piacenza, none. To the *quarantino* then it seems that we must attribute the fact that the death rate from pellagra (which in 1888 was nearly equal for the two provinces) is now 19.4 per 100,000 in Cremona, and only 14.5 in Piacenza; and that whereas 586 new cases have been reported in Cremona in the last four years, only 68 have been reported in Piacenza.

Corn picked unripe becomes moldy; so likewise does corn badly stored. Zeists and antizeists mingle their voices in deploring the damp houses of the peasants, their dirty rooms, where corn is stowed away in an uncovered chest in the corner. Corn is apparently less able to resist dampness than any other grain. Unless it is kept thoroughly dry and in a well-ventilated storehouse, its tendency to become moldy is irresistible. For this reason, transportation by sea is especially dangerous. Italian experts say that no corn whatever can stand a sea voyage, and that all corn imported by a sea route is certain to be moldy, at least in part. Such statistics as we possess lend color to this assertion. It was with the inspection of imported corn and the prohibition of such shiploads as were moldy that came the first unmistakable victory in the fight against pellagra. The years 1897-1900, when the inspection was relaxed, showed a strong recrudescence of the disease; and the decided diminution of pellagra observed in the years 1903-1907 coincides with the increased vigilance of the Government inspectors at the ports and the improved tests which they have learned to apply for the detection of spoiled corn. What is true of Italy as a whole appears to be true of such provinces as the writer has been able to investigate. And a strong confirmation of the general agreement is furnished by the fact that Greece suffers little from pellagra, whereas corn imported from Greece invariably brings with it the disease.

The dangers to guard against from corn in its natural state are thus threefold: Immaturity at the time of harvesting, storage in unhealthy places, and transportation from a distance, especially by sea.

Corn meal or flour becomes moldy even more easily than corn. There is no longer the feeble protection of the inclosing husk, and there are particular conditions tending to precipitate the process of decay. In old days it was the custom—in many districts it still is—for the peasants to store their corn as grain and to take it in small quantities to the local mill, according to their immediate necessities. Where such a practice exists, the danger from flour is minimized and is certainly not to be compared with the danger from unripe or badly kept grain. But there are provinces, like Bergamo, where milling is a large industry. Not only is the local produce ground into meal at big modern mills, but corn is imported for the purpose. The product of the mills is shipped to distant parts of the country and is offered for sale by retailers. Months elapse between grinding and consumption, giving time for any causes of decay to produce their full effect.

Corn meal spoils, just as corn does, if it is kept in a damp or unhealthy place, and it spoils more easily than corn because it contains water. Whether or not it is necessary to mix water with corn in order to grind it into meal the writer does not know; he has had contrary assertions, both entirely positive, on the subject. But necessary or unnecessary, the process is invariable. Corn meal that comes from the mill contains water—not very much, but enough to give the mold fungus a chance. Corn meal, likewise, invariably contains a percentage of spoiled corn. (The Italian law and regulations of 1902-3 allow the importation of shiploads of corn which do not contain more than 5 per cent of spoiled grain.) Finally, the process of milling has a tendency to concentrate the germs of pellagra. Of this point Dr. Stefano Balp, in his remarkable monograph on pellagra in Bergamo (*Venticinque Anni di Lotto Contro la Pellagra* (1881-1906), Biella, 1908), gives the following explanation:

The process of grinding corn at the mill produces several grades of flour. The principal are as follows:

Superfine flour, obtained from certain special grades of corn. It is yellowish in color. A *quintal* of corn (220 pounds) may yield 65 kilograms (143 pounds) of superfine and 25 kilograms (55 pounds) of *nostrana* flour.

Fioretta, or first quality flour. A *quintal* of corn may be made to give from 30 to 60 kilograms of *fioretta*, from 30 to 50 of *nostrana*, from 5 to 10 of *farinetta*, and the residue waste (husks, etc.).

Nostrana, the quality generally used by the peasants.

Farinetta, a grade between *nostrana* and husks. Now, the experiments of Mariani and Volpi-Gherardini have proved that these different grades differ widely in their relation to pellagra. The *fioretta* produced even from very moldy corn, when subjected to the chemical toxicological tests, does not show signs of maidic poison. These begin to appear in the *nostrana*, and are concentrated in the *farinetta*, and still more in the husks. The explanation is the fact that cylindrical mills separate the germ of each grain of corn and leave it to appear in the *farinetta* and the husks. The germ is the weak spot of corn, the door where infection enters, is the first place to be attacked by hyphomycetes, and the richest in maidic poison.

Balp goes on to show how profitable it is for the peasant to sell his corn to the miller and to buy in exchange *farinetta*, and suggests that if the use of *farinetta* for human food could be entirely prohibited the cylindrical mills would offer a strong obstacle to the disease which they now encourage. But he warns us at the same time that the very *fioretta* from spoiled corn, though it may contain no poison, is certain to contain the germs from whose action the poison will be formed, and that abundant opportunity for its formation will

be offered if the flour is sold at a distance and remains for some time in the hands of the middlemen.

Finally, corn may become moldy even after it is cooked. In entire districts it is said that one of the chief causes of pellagra is the habit of making large loaves of corn bread, which require several days perhaps as many as ten—for a family to consume. These loaves are cooked only on the outside; the middle portion decays rapidly, allowing the pellagra poison to form. Fortunately the habit of making these big loaves—and, indeed, of eating corn bread—is diminishing. But even *polenta*, the only food of a large part of the population, may become moldy. Dr. Bonservizi, of Mantua, goes so far as to say that in his province a large part of the pellagra springs from the habit of eating, cold for breakfast and at midday, the *polenta* cooked the night before. (*Atti del Terzo Congresso Pellagrologico* 65-66.) The *polenta* is kept in a wicker basket in a corner of the kitchen, where it is blackened by smoke and spotted with mold. The cloth which covers the bottom of the basket has always, he says, the smell of mold. As peasants can not be prevented from eating food cooked the night before, the only remedy is to prohibit altogether the use of corn as human food. An incidental remark of Lombroso's gives the true answer to such a suggestion:

To tell a peasant not to eat corn is about as practical as to tell him to be rich, but to prevent him from eating a certain diseased part of the corn, and to advise him to eat the rest in a certain manner, in order that it may not become diseased, is well within the bounds of possibility.

CURATIVE AND PROPHYLACTIC, ITALY'S FIGHT AGAINST PELLAGRA.

How shall the people be prevented from eating moldy corn? This is the problem which confronts the legislator and the philanthropist alike. For its clear realization and for the chief measures adopted to solve it, we are indebted to the zeist school, and in particular to Lombroso. Early reformers had either misdirected their efforts in the direction of finding a specific cure for the disease, or else had spent their energies on a number of partial preventives, or rather palliatives. The zeists have compelled general recognition of the obvious truth that prevention is better than cure; and at the same time, by the very dogmatism of their monistic creed, have given unity of object to the work of prevention. It is important, indeed, to cure such pellagrous patients as exist; it is important to improve the general living conditions of the agricultural population; but what is still more important, and what, so far as pellagra is concerned, is adequate to exclude moldy corn and its products from the peasant's diet.

On the curative side of the problem, of course, can not be neglected the thousands whose patients are counted by thousands in a single province. But no good remedies have been discovered for pellagra except a complete change of diet. Joseph II of Austria, the first emperor to concern himself with pellagra, gave all the encouragement in his power to investigators of the disease. Under his patronage prizes were instituted in Milan for the best essays on the cause and treatment of pellagra; and in 1784 a special hospital for pellagrous patients was opened at Legnano, with Gaetano Strambio as

director. Joseph hoped that Strambio would discover the cause of pellagra and find a specific remedy. When Strambio, after four years of effort, honestly confessed that he could not attribute a single one of his many cures to any specific medicine or any particular form of treatment, Joseph regarded the experiment as a failure and closed the hospital. Its patients he distributed among the ordinary provincial hospitals, hoping that many doctors, acting independently, might light upon the great discovery. The disease kept spreading meanwhile.

The first serious attempt, in Italy, to deal with pellagra, was in 1879, ten years after Lombroso's famous essays. A census was taken of the pellagrous patients in Italy, and as a result of the census a bill was introduced for the regulation of corn cultivation and importation, and the establishment of public desiccating machines. The bill failed, and the only immediate result of the census was an annual grant of 36,000 *lire* (\$5,790) from the Government toward the relief of pellagra—about 6 cents for each patient. This amount was raised at a later date until it amounted to 70,000 *lire* (\$13,510) in 1899; and under the law of 1902 100,000 *lire* are contributed annually for the prevention and cure of pellagra, and as much more for the introduction of improved methods of agriculture. The census of 1879 was an epoch-making event. It brought home to the people as a whole the gravity of the situation, and it stimulated the various provincial governments to act independently. Many provinces appointed pellagrological commissions, took censuses, and founded hospitals, or *locande sanitarie*. From 1879 to 1903 was a period of local and provincial activity. The conclusions of doctors were tested on a small scale, and the way prepared for general legislation. Meanwhile, in 1895, the Crispi administration had issued an ordinance forbidding the importation of spoiled corn, and providing for inspection at the chief ports. In 1902 the "Law for the prevention and cure of pellagra" was passed,¹ and in the following year was issued the regulations for the enforcement of the law. Since that time four years have elapsed, and already pellagra may be said to be a doomed disease. The statistics, so hard to interpret as regard particular details, bear unmistakable testimony to a general decline in the disease under the operation of the law.

The main provision of the law and regulation are as follows:

I. Absolute prohibition of the importation, sale, holding for sale, or grinding of spoiled corn or products of corn destined for human food. If the corn is destined to feed animals or to be used for other purposes, it is admitted only by special permit of the prefect.

II. Obligation upon all communes to report cases of pellagra. A commune with several cases is declared pellagrous, and falls under the following provision:

1. Government inspection of all corn dried, stored, and consumed in the commune.

2. Obligation on the part of commune and province to establish public desiccating plants, to provide curative nourishment for all patients, to provide patients and their families with free salt, and to treat severe cases in special institutions.

III. Establishment of pellagrological commissions in all provinces affected with the disease.

¹ A translation of this law, and a summary of the regulations of 1903 are given as Appendix I.

IV. Assignment of a government grant of 200,000 *lire* annually and obligation upon provinces and communes to defray, in equal portions, the expenses entailed by the act.

This is the charter under which the struggle against pellagra is now being carried on. It is proposed to examine the several dispositions of the act; then to give some details in regard to certain provinces which the writer has been able to investigate in person, and finally, to append such statistical data as will give an idea of present conditions in Italy as a whole.

The dispositions of the act are of two kinds, curative and preventive. The curative measures, which may be examined first, fall into several classes, distribution of salt, administration of food, either at the patient's home or at sanitary stations (*locande sanitarie*), treatment of severe cases in hospitals, pellagrous hospitals (*pellagrosari*) and insane asylums. The prophylactic measures are more numerous. Those to be chiefly noted are: The testing of corn and flour brought in at the frontier or offered for sale or brought to the mill, the exchange of bad corn for good, desiccating plants, cheap cooperative kitchens, the improvement of agricultural methods, and the instruction of the people as to the danger of bad corn.

CURATIVE MEASURES.

Salt.—Salt is a government monopoly in Italy; its price is high. A plentiful use of salt is supposed to counteract the bad effects of a corn diet. Accordingly, the Government bestows salt upon the families of pellagra patients in quantities not exceeding 17½ pounds for each adult or 11 pounds for each child per annum. The administration of the salt is attended with numerous restrictions, as will be seen from annex 3. The amount of salt distributed gratuitously during the years 1904–1907 is as follows:

	Pounds.
1904–5.....	1,953,469
1905–6.....	2,520,553
1906–7.....	3,118,628

Curative diet.—Article 11 of the law of 1902 declares that “curative diet for the indigent pellagrous is obligatory.” Article 32 of the regulations of 1903 provides for two periods of at least 40 days each per annum for the distribution of curative food; it declares that the diet shall be approved by the provincial pellagrological commission, and that medicines shall be included in the diet. These provisions are carried out by means of house-to-house distribution, of economic kitchens, or of sanitary stations.

Distribution to families is a system adopted only in provinces where, as in Sondrio, pellagra is decreasing or exists only in a few communes. Here the need of special institutions is not felt. The pellagrous patients of a commune are few, and the communes are scattered. Hence the most practical system is to distribute provisions directly to the affected families, through the communal authorities.

Economic kitchens, as their name implies, are places where sound food, well cooked, is supplied to the rural populations at low prices. Usually the kitchens belong to the communes; sometimes they are the property of charitable organizations; occasionally they are cooperative. The original idea of the kitchens was that the food supplied

should be cheap, but not gratuitous. At present, however, it is not unusual, especially in districts where there is no *locanda*, or sanitary station, to use the local kitchen as the means for distributing to pellagrous patients the food prescribed by the law. In 1906 there were 171 of these kitchens in Italy; in 1907, 187.

Sanitary stations (*locande sanitarie*) are a development of the cheap kitchens in accordance with the special needs of pellagra patients. The first stations were in the province of Bergamo, where they existed as early as 1884. The institution was soon copied in the neighboring province of Brescia, where Prof. Ceresoli, at Bagnolo Mella, introduced many improvements on the Bergamo type and developed a number of experiments. The history of the *locanda* at Bagnolo Mella can be traced in annexes 5 to 12, and is typical of the development of the institution elsewhere. The sanitary station is a place where pellagrous patients come once—sometimes twice—a day during a stated period to receive food, which they consume on the spot. The food consists of soup, bread, meat, and wine, with a certain amount of cheese, milk, and vegetables. Exact descriptions of the means given at Bagnolo Mella will be found in annex 5, page 19; annex 6, page 9; annex 8, page 16; annex 10, pages 19, 22, 23; those of Bergamo in annex 13, page 21. But the diet is modified in accordance with the needs of individual patients. The general idea is to furnish the underfed pellagrous patient with strong, nutritious, non-maidic nourishment during a few weeks, and thus to build up his general system. The quality and quantity of the food supplied are limited, of course, by financial considerations. At Bagnolo Mella, for instance, at a time when three meals a day were given the total cost *per diem* of each adult patient never exceeded 1 *lira* (19 cents). The periods selected for the sanitary station treatment are the spring and the autumn, the times when pellagra is most virulent. The dietary treatment is combined with medical treatment, and also, in many *locande*, with a course of baths. Sometimes the patients are given special foods, such as bread containing 5 to 15 per cent of blood. (Annexes 9 and 10.)

The advantages and disadvantages of the *locanda sanitaria* are the subject of much discussion. Undoubtedly a treatment of 15, or even of 40, days is not sufficient to produce a permanent cure. Many patients return to the *locanda* year after year without even obtaining more than a passing benefit. On the other hand, the *locanda* has the immense advantage of giving relief to an enormous number of sufferers at a very small cost. Its results may not always be permanent, but for the time being they are very striking. More than 80 per cent of the patients go away distinctly improved, and probably a large number of incipient cases, especially among the young, are permanently arrested. The dietary period is sometimes prolonged after the station is closed by home distribution of food and medicine. On the whole, for incipient cases the *locanda* may be pronounced a valuable curative agent in the fight against pellagra. The number of *locande sanitarie* during the past few years has been as follows:

1904.....	424	1906.....	533
1905.....	538	1907.....	534

The provinces which have been most successful in combating pellagra are those which, like Bergamo and Brescia, have had a large number of *locande* in operation during a considerable period of time.

Pellagrosari.—Special hospitals for the care of pellagrous patients exist to the number of 22. They are intended primarily for cases too acute for a mere diet treatment and requiring the constant supervision of a physician. In the *pellagrosario*, as in the *locanda*, the treatment is threefold: Dietary, balneary, and medicinal. The principals of the diet are the same as in the *locanda*, with greater variations, however, on account of the greater severity of the cases. The baths administered are of many kinds—sulphurous, ferruginous, arsenical, saline, douches, etc. The medical treatment, though subsidiary to diet, is not without importance or effect.

Pellagra hospitals are supported, like the sanitary stations, out of public funds, assisted by private beneficence. The state contributes a certain sum, which is increased by charitable gifts, and whatever expense remains is divided between the province and the communal administrations. As the comparative inefficacy of curative methods and the paramount importance of prophylaxis becomes more clearly realized, the tendency increases to use the *pellagrosari* in the cause of prevention. To the *pellagrosario* at Inzago, which the writer has been able to visit, only persons between the ages of 12 and 20, or else incipient cases, are now admitted. The effort of Director Cav. Giuseppe Friz is to secure the children of pellagrous patients, and to take them into the hospital the moment the first signs of pellagra appear. The statistics of the hospital are admirably kept. Every detail in regard to a patient's past history, to his family, to the diet which he is accustomed, and to his precise symptoms, are carefully registered at the time of his admission. His weight is then taken and his strength tested. During his stay a record is kept of his diet, of the medicinal cure administered, and of the results upon his system. Finally a systematic effort is made to record his history after leaving the hospital. Some of the forms used in the *pellagrosario* at Inzago are inclosed as annex 39. An account of this admirable institution is published in the *Atti del Secondo Congresso Pellagrologico Italiano* (1902), page 98 ff, and another, by the same author (Cav. Friz) in the *Atti del Terzo Congresso*, 1906, page 88 ff.

PREVENTIVE MEASURES.

Insane asylums.—Pellagrous insanity is recognized as a special form of dementia, and receives specific treatment in all Italian asylums. The tendency exists to send every year a larger proportion of pellagrous patients to asylums instead of permitting them to linger in their own villages. Nevertheless, the number of new cases of pellagrous insanity admitted to the asylums has decreased from 2,160 in 1904 to 1,832 in 1905, 1,065 in 1906, and 828 in 1907. The treatment of the pellagrous insane is a question for physicians, outside of the scope of this report. The advanced state of psychopathic science in Italy is a matter of universal knowledge. A visit to the asylum of Mombello, near Milan, offers convincing evidence of the high efficiency and modern organization of public institutions for the insane in Italy. The report of the Mombello asylum for 1906 is inclosed as annex No. 14. The pellagra statistics appear on page 55ff. The result of these various therapeutic measures has been, undoubtedly, to mitigate greatly the severity of the disease, to reduce the number of pellagrous insane, and to decrease the number of deaths. In order to elim-

inate pellagra, however, no therapeutic measures are adequate. The well population must be preserved. The peasant must be protected from spoiled corn coming from abroad. He must be taught to grow corn that will ripen, to harvest it ripe, to dry and store it properly, and to see that it does not become spoiled in milling. He must be shown the dangers of eating moldy corn, and be trained, if possible, to give up the more dangerous forms of maize diet. Let us see how, and how far, this is being accomplished.

Prohibition of spoiled corn.—As far as regards corn imported from abroad, the provisions of the laws of 1902-3 seem adequate in most respects. All suspicious cargoes are tested by experts; and if the condition is not satisfactory the corn must be sent to a distillery or else be denatured. Spoiled corn can be detected in a number of ways. Such outward signs as mildew, or the smell of mold, are of course conclusive, but they can be removed by drying in the sun; their absence, therefore, does not prove the soundness of the corn. But the peasant should be warned against any corn that is covered with dust, that is damp to the touch, or that gives forth any smell of mold when warmed in the palm of the hand. He should be on his guard against corn of a pale color with a dull surface.

There are several chemical tests for distinguishing sound from moldy corn.¹ The first test is the proportion of ashes. It is said that no sound corn contains more than 4 per cent of ashes. This point is doubtful, and the test requires an accurate apparatus, and is unsuitable for general use in inspecting imported corn. The second test is that of Gosio, with perchloride of iron. Corn flour which has been kept in double its volume of alcohol (at 80°) for several days, being frequently shaken meanwhile, and exposed to the sun or to heat, is tested, after the alcohol has been filtered and evaporated away, in a bath of perchloride of iron solution. The reaction varies in color from a dark green to a violet blue, according to the soundness of the corn. This test, though one of the best, is not entirely sufficient. It should be supplemented by the test of acidity, since moldy corn is always more acid than sound.

The biologic test of fruitfulness is one of the best, since spoiled corn is certain to lose much of its germinating quality. The test is easy to apply, but is of course ineffective for corn which has been desiccated. There is also the test of poisonous content by the actual inoculation of mice.

In theory possibly all of these tests are required. But for practical purposes it may be said that corn which appears perfectly sound and which does not react to the perchloride test is pretty sure to be harmless. In doubtful cases the germination and acidity tests can be employed.

Inspection of corn at the frontiers is comparatively easy; but at the mills, or in the markets, and especially in the shape of flour, it is practically impossible. The flour problem is entirely beyond the control of any government; the only hope of its solution would lie in government or municipal ownership of all mills. This proposal is eagerly supported by those interested in the pellagra question; it is certainly more practical than any plans for diminishing the corn area in Italy, or for prohibiting entirely the importation of corn. Whether

¹ For two excellent brief accounts of these tests see Marie, *op. cit.*, pp. 67-62, and Antonini "Sui criteri e Metodi più efficaci per rilevare l'avaria del granoturco" in *Atti del Terzo Congresso*, pp. 70-82.

it is likely to be adopted the writer can not say. Meanwhile, and so long as milling is a private industry, the effort must be to send only sound corn to the mill.

Cattedre ambulanti.—Every Province of Italy has a commission for the encouragement of improved methods of agriculture. These "moving chairs"—or, as we might call them, farmers' institutes—are active institutions which have contributed notably to Italy's great agricultural progress during the last decade. In solving the pellagra problem they cooperate very usefully with the provincial pellagrological commission. The pellagrologist wishes to get rid of *quarantino* corn; the *cattedre ambulanti* show the peasant a better crop than *quarantino*, teach him how to grow it, and prove to him by actual experiment (*campu dimonstrativi*) that the new crop is more profitable than the old. The rapid disappearance of *quarantino* in Lombardy and Venetia is largely the result of intelligent missionary work by these agricultural commissions. Instead of *quarantino* or *cinquantino* the peasant is taught to plant the *Mathilde* potato, millet, mustard, or some kind of forage. There is no doubt that all of these crops are more profitable, as a second crop, than *quarantino*. According to Frosini, in *Atti del Terzo Congresso*, page 157ff, the results of *cinquantino*, *Mathilde* potatoes, and millet planted after wheat on adjacent pieces of land were as follows:

	Cinquantino.	Potato.	Millet.
Product per hectare..... kilograms	20.00	120	22.50
Price per kilogram..... lire	14.30	5	16.00
Gross return per hectare..... do.	286.00	600	360.00
Cost of cultivation..... do.	202.50	300	144.00
Net return per hectare..... do.	83.50	300	216.00

But it is no small triumph to have convinced the Italian peasant of the fact, and to have induced him to abandon a traditional crop for one with which he was unfamiliar. Of the provinces where the writer has been able to make personal investigations, it appears that *quarantino* is very little grown in Sondrio, Como, Milan, Bergamo, Pavia, or Piacenza. In Cremona there is still a large *quarantino* area, which shows signs of decrease. In Mantua the crop still flourishes; in Brescia it is grown in decreasing amounts. Next to the inspection of foreign corn, the diminution in the supply of *quarantino* has probably accounted more than any other factor for the encouraging decrease of pellagra during the last five years.

Desiccating plants.—Artificial drying of Indian corn was practically unknown in Italy until within a few years. Such corn as was dried at all was merely hung in the open air, on frames, at the sides of the houses. Most of the corn was stored as soon as picked, and in any storing place that was available, without regard to ventilation or cleanliness. If Italy is the home of pellagra while Mexico and Burgundy are entirely free from the scourge, the difference may be due simply to the fact that in Mexico and Burgundy corn is fired almost as soon as harvested. Artificial desiccation is the most important of all prophylactic measures against pellagra. It has objections, however, to encounter from the peasantry. The corn loses weight, they

say. This is true; but the weight lost from decay is far greater. It will not germinate. This is true likewise, if the desiccation is not properly performed; but the best desiccators leave the corn with all its natural properties unimpaired. It is expensive. Not so expensive, on the whole, as the outdoor frames. The best desiccator yet contrived, that of Pietro Cattaneo, dries 110 pounds of corn with a fuel consumption of 1 cent. Nevertheless, in order to remove, as far as possible, the objection of expense, the law of 1902 provides that every family may dry at the public desiccator, free of charge, so much corn as is required for the household needs. Further use of the desiccator must be paid for, but at rates which allow nothing for profit.

Desiccators are of two types—fixed and portable. The portable type has the great advantage of saving the cost of transportation of the corn. It can be carried in sections and set up in the middle of a corn belt. It is cheap enough to be within the means of peasants. The fixed type, however, is infinitely preferable. The air is kept at an even temperature and circulates equally in all parts of the machine; thus none of the corn is spoiled or deprived of any of its properties. A pamphlet describing the Cattaneo desiccator is inclosed as annex 15. Air heated by a furnace is forced by a ventilator into a chamber of seven stories. Each story is a circular revolving wire tray, containing about 1,390 pounds of corn. The top tray is filled from above. After a certain time its contents are emptied by pressing a lever into the tray below in such a way that they are thoroughly remixed. The corn thus passes gradually to the bottom tray, whence it goes to a receptacle, where it is cooled by means of a ventilator, and thence out of the machine by an inclined plane. The first tray load of corn takes seven hours to pass through the machine; after that 1,400 pounds come out each hour. The cost of the machine is about \$540 and the power required to run it about 2½ horsepower. Larger machines of the same kind, costing about \$1,840, have a daily capacity of 88,000 pounds and require an engine of 8 horsepower. In the Cattaneo desiccator the air is forced through the trays in both an upward and a downward direction; the air which has absorbed dampness from the corn is replaced constantly by dry air; the temperature is kept low (about 104° F.) with economy of fuel and without risk of injuring the corn; and the mechanism is so simple that the machine can be handled by any laborer of ordinary intelligence.

The best of the movable desiccators is probably the Boltri, which costs about \$112. It is described by Prof. Ceresoli in annex 17, page 30ff; but in view of the necessity of retaining all the properties of the corn (since seeds that have lost the reproductive power decay with especial rapidity) there is no doubt of the advantage of the more elaborate and expensive plants.

Desiccation, if applied to moldy corn, will remove the moldy appearance, but in order to kill the poison germ a temperature not merely uneconomical, but actually destructive of the grain would be required. It is therefore of the utmost importance to prevent the use of the public desiccator for corn which is even a little spoiled.

Public desiccators are now very numerous in Italy. There were 179 in 1904, 221 in 1905, 389 in 1906, and 461 in 1907. The amount of corn desiccated in public plants was 54,698 *quintals* (12,033,500 pounds) in 1904 and 248,850 *quintals* (54,747,000 pounds) in 1907.

Public storehouses.—Article 10 of the law of 1902 gives power to the prefects to order the authorities of any pellagrous commune to

found a municipal storehouse for the use of such inhabitants as do not possess sanitary houses; yet the insanitary conditions under which corn is stored in the houses of peasants have long been recognized as a potent producer of pellagra. "The greatest injury to this food is inflicted," says Ceresoli,¹ "by those who are to use it. The corn is kept almost always in the darkest corners of the rooms against damp walls, surrounded by dirty clothes, exposed to all human emanations, and to all those foreign substances introduced by animals and insects. . . . Pellagra will not cease until the worst houses are destroyed, the rust cleaned, and the corn stored in a place apart." There is no doubt that the public storehouses will come, but for the present the cost of construction and maintenance and the expense of transportation are beyond the means of the Italian communes. Nor are the silos used to any great extent.

Rural bakeries.—The effort to eliminate from the diet of peasants bread made of Indian corn and to substitute wheaten bread has taken shape in the establishment of bakeries, where good wheaten bread is furnished at cost. The institution is comparatively new. In 1904 there were only 77 such bakeries, and in 1905, 89; but in 1906 the number had risen to 584 and in 1907 to 591. There is no question that corn bread will soon cease to be a common article of food in northern Italy; and the elimination of corn bread will mean, if nothing else, added variety in the diet of agricultural classes.

Corn exchanges.—The idea of an exchange where moldy corn could be exchanged for good is due to Prof. Ceresoli, who carried it into execution at Bagnolo Mella. The peasants bring in their corn, good or bad, and receive in exchange a lesser amount of perfect flour, deduction being made for the cost of milling and for any defect in the corn delivered. The cost of the operation, which was met at Bagnolo Mella by charitable gifts, amounted to 1.20 *lire* a *quintal* (23 cents per 100 pounds) of corn. At Bagnolo Mella the exchange was popular with the community; it meets with the approval of all students of pellagra, and it is not very expensive, in comparison with the immense benefit conferred. Nevertheless, the scheme has not been successful. In 1904 there were 4 exchanges, and 439 *quintals* of corn exchanged; in 1905 the figures rose to 7 and 1,145, only to fall in 1906 to 5 and 674, and in 1907 to 4 and 292; for the exchange will never give more than 5 kg. at a time, and usually gives only 1 kg. in order that the flour may not have time to spoil at home. The history of Prof. Ceresoli's attempt will be found in annexes 23–26.

GENERAL CONCLUSIONS ON PREVENTION.

The list of preventive measures against pellagra is by no means exhausted, and many have been suggested which have not been adopted. In general, the object is to get at the children; to prevent pellagrous mothers from nursing their babies, or, if this can not be prevented, to see that the mothers are well fed; to treat a child the moment he or she shows the slightest symptoms of pellagra, and to send him or her away from the surroundings where the pellagra has been acquired. There are authorities, however, and of the highest rank, who see no remedy for pellagra short of the total elimination of corn as human food. Some would forbid its importation; some, its cultivation; some would compel its denaturation before sale; others,

¹ Annex 18, p. 17.

who have noticed that pellagra increases when corn is dear, would throw open the ports of the country by the removal of the protective duty. Still others wish for the prohibition of the cultivation of certain kinds of corn, or of all corn in localities where it is not "economically profitable." So long as national habits remain what they are, so long will there be a demand for a certain amount of corn. If importation is difficult, the home crop will increase, and vice versa. It is not by legislative restrictions, but through changes in a national taste, that corn consumption can be diminished. Education of the people to the dangers of bad corn, their awakening to the possibility and pleasantness of a varied diet—there is the remedy. Much is being done to educate the people. The indefatigable Permanent Committee of the Interprovincial League against Pellagra edit a magazine, the *Rivista Pellagologica Italiana*, devoted to the struggle against the disease. Popular pamphlets are distributed in great numbers (annex No. 28 is an example; another very good one is printed in *Atti del Terzo Congresso*, p. 239); popular lectures are held everywhere; big colored lithographs, representing the healthy laborer fed on sound corn and the pellagrous laborer fed on spoilt or moldy corn, hang on the walls of public lecture halls; and the pellagrological and agricultural commissions of the different provinces multiply instructions by precept and example. The results vary with the various districts. But they are encouraging on the whole; and they coincide with a marked rise in general prosperity. The laborer who wants to eat something besides corn, can do so to-day as he never could before. Great numbers of the rural population are employed in factories, where they obtain a varied diet. The effect of industrial life is clearly shown in the enormous decrease of pellagrous cases between the ages of 20 and 30. Many Italians spend the summers in foreign countries as laborers; when they return for the winter it is with a stock of money for the family, but also with a stock of experience. They no longer care to live on *polenta* only. Their wives and daughters who have stayed at home may go on with the old fare, but the men require a mixed diet. It is industrialism and temporary emigration, far more than the habit of dining occasionally at a *trattoria*, which accounts for the predominance of women over men among pellagrous patients of the vigorous age. If the predominance is not still more marked, it is due to a contrary tendency among those who stay at home and work in the fields. Among these classes the men suffer most; possibly because they work harder, possibly because they eat more polenta, or for both reasons. One thing, at any rate, is plain—that even without government activity and private aid pellagra would be diminishing in Italy to-day. The consumption of meat is increasing rapidly; the people are living better, the farm laborer gets higher wages, and if he accepts a part of his wages in kind, he no longer allows the landlord to pay him in moldy corn. Thus many causes unite to aid the fight against pellagra, and for this reason it is hard to say how much, if any, of the progress is due to legislative enactment. Statistics, as will be seen, lend but little aid; and the only way to form any definite judgment is to visit the affected districts and hear what is said by the men closest in touch with the actual facts. This the writer has been able to do in several of the provinces of Lombardy, and at Novara; the results are briefly appended.

NOVARA.

The Province of Novara still contains pellagra, if we judge by official statistics. There were 7 deaths in 1907 and 9 new cases reported. As a matter of fact the disease no longer exists in the province. Ever since rice culture was introduced pellagra has been doomed. The improved general conditions, temporary emigration, industrialism, and the influx of tourists have rid the province of pellagra without the help of any law. The deaths which appear in the statistics are of old patients; the "new cases" are either importations from across the Ticino or old cases who have reported lately for the sake of free salt. In Novara the fight against pellagra no longer exists; it has been won. And what is true of Novara is probably true of Piedmont as a whole.

SONDRIO.

In Sondrio 11 out of the 78 communes are still officially pellagrous, but 3 out of the 11 no longer contain pellagrous patients. The total number of pellagrous cases, according to Dr. Cav. Besta, the provincial doctor and a learned pellagrologist, was at least 500 fifteen years ago. For the last five years the figures are:

	1904	1905	1906	1907	1908
Total cases	101	59	55	51	46
Deaths	12	6	2	8	1
New cases		1	5	2	

Only one commune in the province is really pellagrous; this is Montagna, one of the most remote hill towns, where there are 18 pellagrous patients out of a population of 2,632. The disease is obviously dying out; there is no need for kitchens, for stations, for desiccators. Prosperity, temporary emigration, and more cleanly habits have sufficed to reduce the disease. Until very recently Tirano, with 6,500 inhabitants, had but one butcher; now it has four. The statistics of the different communes of Sondrio, as copied from manuscript documents, are inclosed as annex A1.

COMO.

Como is a much larger province than Sondrio, with four times as many inhabitants. Of its 221 communes, 25 are pellagrous. But the 89 cases which form the total number of patients in 1907 are distributed among 30 communes, and no commune has more than 7. The figures for the province as a whole are as follows:

	1904	1905	1906	1907
Total cases		180	91	89
Deaths	32	27	22	28
New cases reported		1	21	11

In Como, as in Sondrio, pellagra is no longer regarded as a serious danger. The province is rich and industrial. *Polenta* is nowhere the sole article of food. *Pane giallo*, or corn bread, is little eaten, nor are loaves allowed of more than 4½ pounds in weight. The efforts of the pellagrological commission have been successful in abolishing the cultivation of *quarantino* and substituting *Mathilde* potatoes and clover. However many deaths and "new cases" may apparently continue to occur, the local authorities are satisfied that pellagra has practically ceased. Its decline they attribute mainly to improved general conditions. Annex A2, with the latest statistics for the various communes, was copied from the provincial records.

MILAN.

Unlike Novara, Sondrio, and Como, Milan is a province where the pellagra problem still exists. In spite of 30 years of continual and intelligent activity¹ in the struggle against the disease and the evil conditions which bring disease, the Milanese have not yet succeeded in freeing themselves entirely from pellagra. The number of pellagrous patients can not be given with certainty; not for lack of data but because the investigators, after repeated attempts to discover the facts, have become convinced of the unreliability of their figures. Milan, like Brescia, is now undertaking a laborious house-to-house census, which may result in a complete picture of present conditions. At present we can only estimate the cases of pellagra as probably more than 1,000 and certainly less than 1,500, less than one-fourth of the figures of 50 or even of 30 years ago, and about 1 for every 1,500 inhabitants. The census of December 31, 1905, gave a total of 961, but a number of communes sent in no returns. At present 102 out of 297 communes are pellagrous. The list is given in annex A3, which may be summarized as follows:

	1904	1905	1906	1907
Total cases.....		961(?)		
Deaths.....	168	143	1107(47)	1106(54)
New cases reported.....	26	16	269(99)	244(133)
Cures.....			48	76
New cases admitted to the insane asylum.....	79	62	28	27

¹ The figures in parentheses are from annex A3 copied from the provincial records; the nonbracketed figures are those furnished by the ministero dell'interno for this report.

² Annex 14.

The great obstacles to the struggles against pellagra in the Province of Milan have been the density of the rural population and the fact that people will not believe that pellagra comes from eating bad corn; and they are so thickly settled their living conditions are frequently insanitary. At last, however, they are giving up "yellow bread;" in the course of 20 years they have learned that good wheaten bread can be bought for 3 or 4 centimes a kilo more than bad corn. The Government, besides furnishing desiccating plants, cheap kitchens, curative establishments, etc., gives the peasants hens in the double

¹ See annex A4, *La Provincia di Milano e la Pellagra*.

hope that they may eat the eggs and give their moldy corn to the hens. The Milanese authorities, like those of Como, are hopeful in regard to the pellagra conditions; but they do not trust to general economic progress to eradicate the evil. The fight against bad corn must be pursued with intelligence and unrelaxed zeal; and the efforts of the individuals and communities must be aided by legislation. Especially the cultivation of *quarantino* must be entirely abolished. It persists in the higher regions, known as the Alto Milanese; and although these districts are richer and more prosperous than the irrigated lowlands, they have far more cases of pellagra. Another much needed innovation, which has been successfully introduced in the Province of Milan is the cooperative mill. And great attention has been paid here, as at Bergamo, to improving the breed of cattle. The object here is to make cattle raising profitable and to increase the pasturage area at the expense of the corn acreage.

PAVIA.

The Province of Pavia has 221 communes, of which 92 are afflicted with pellagra. Seventy-one of these are in the *circondario* or district of Pavia; almost all of the others, in the district of Mortara. The number of cases of pellagra is not known. From the provincial records annex A6 has been obtained. From it and other records the following table is made up:

	1904	1905	1906	1907
New cases.....	2	14	¹ 45(35)	¹ 32(35)
Deaths.....	48	36	22(29)	24(33)
Cures.....			27	16

¹ Bracketed figures are from the statistics furnished by the ministry of the interior.

The population of Pavia is 476,554. Pellagra is not one of the illnesses most dreaded, malaria being a more dangerous enemy. Nevertheless an active war is carried on against the foe. The province has 276 municipal bakeries and 142 desiccating plants.

BERGAMO.

Bergamo is perhaps the most interesting province of Lombardy for the study of pellagra. The terrible prevalence of the disease led to its early study and to active measures of repression, formed as early as 1883. It has striven unremittingly to combat the malady and has introduced many of the experiments later incorporated as legal enactments. Practically everything there is to be known about pellagra at Bergamo is contained in Prof. Balp's masterly monograph (annex 13); to it there is nothing to add except some of the most recent figures. In Dr. Antonini's manual (*Pellagra*, Milan, 1902) is an interesting account of the province and of the causes for its high percentage of pellagrous cases.

Bergamo has a population of 419,304, with 306 communes, of which 130 are pellagrous. The pellagra statistics of this province has always been collected with great care by experts. It will be interesting to give some of the figures:

	Total cases of pellagra.	Cases of pellagra per 100,000 inhab- itants.	Number of deaths.	New cases.
1856.....	8,522	215	.....	.....
1879.....	9,484	210	.....	.....
1881.....	8,504	210	.....	.....
1899.....	6,617	140	173	.....
1905.....	3,891	80	97	8
1906.....	.....	.....	93	599
1907.....	.....	.....	64	304
1908.....	.....	.....	.....	86

The number of male and female sufferers from pellagra is nearly equal, with a slight predominance of males. The age percentages are approximately as follows:

	1856	1906
1 to 10 years.....	4.1	6.7
11 to 20 years.....	11	11.4
21 to 30 years.....	16.4	5.5
31 to 40 years.....	22.5	14.4
41 to 50 years.....	20	20.4
51 to 60 years.....	16	18.7
Over 60 years.....	9.5	22.5

This is a striking testimony to the efficacy of industrialism, in mitigating pellagra during the working age; and of therapeutic progress, in prolonging the lives of sufferers.

The cheap kitchen, the sanitary station, and the pellagra hospital have existed in Bergamo since 1884. There is no province which attends so generously to feeding the pellagrous patients. Desiccating plants, rural bakeries, and experimental farms exist in considerable numbers. What has been the result of so much effort?

The result has been a striking decrease in the number of pellagrous patients and in their mortality. But what prevents the extirpation of the disease is the fact that Bergamo is the center of the milling industry, and supplies five-eighths of the flour sold in Italy. Corn is bought at Bergamo almost exclusively in the form of flour. The flour invariably contains a percentage of spoiled corn and a percentage of water. So long as corn can be imported or sold with a proportion of 5 per cent spoiled; so long as the millers are not controlled by Government inspectors; so long it is morally certain that pellagra will remain at Bergamo.

BRESCIA.

Brescia suffers hardly less than Bergamo from pellagra—124 of its 280 communes are affected; and the total number of sufferers must be between 3,200 and 3,500 out of a population of 543,961. There are

few provinces, however, where the fight against pellagra has been so successful. Largely under the guidance and inspiration of Dr. Ceresoli, of Bagnolo Mella, all the remedies and preventive measures known to science have been adopted at Brescia. The results have been striking, as the following figures will show:

	1888	1899	1904	1905	1906	1907
Total cases (probably not exact).....	{ 13,663 (1881) }	7,827		3,291		
New cases reported.....			49	57	345	256
Deaths.....	273		158	148	135	101

The province, however, contains many very poor districts; and for this reason the fight is still an uphill one. The poverty of some communes leads them to conceal cases of pellagra, in order to avoid the expense of the curative diet. The statistics for Brescia are probably, therefore, understatements of the real conditions; for accurate figures we must await the result of the house-to-house census now in progress. Brescia imports no corn and has no large milling business. The peasant takes his own corn to the local mill and receives it back in the form of flour. The only problem therefore is to make him ripen, dry, and store properly the corn of his own fields. The Brescian peasant now grows millet, mustard, or a forage crop instead of *quarantino*;¹ he is rapidly abandoning the consumption of "yellow bread," and learning to eat the wheaten bread of the rural kitchen. He takes his corn to be dried at the communal desiccator, and if in spite of these precautions, or through neglect of them, he has become pellagrous, he repairs at once to the sanitary station or to the cheap kitchen. At Bagnolo Mella, a little village in the heart of the pellagra endemicity, Dr. Cesare Ceresoli has worked unremittingly for 18 years. There are his model *locanda*, his corn exchange, his desiccator, and his rural bakery. He has recently patented a portable storehouse for corn, to hold 150 hectoliters.

CREMONA AND PIACENZA.

A minute comparison of these provinces would form an interesting study, as has been already indicated (p. 12). Unfortunately the writer has not yet been able to obtain the provincial statistics. Pellagra is steadily diminishing in both provinces.

PRESENT STATE OF ITALY IN RELATION TO PELLAGRA.

In estimating the number of pellagrous patients in Italy to-day, four statistical tests may be applied:

The total number of cases would be no true index of the progress made. Pellagra patients may live 25 years with the disease. That is longer than the whole period of struggle, and six times as long as the period of legislative control. But the figures are not procurable. Strambio has shown,² by an elaborate comparison of the censuses of

¹ Except in one district, that of S. Pietro.

² *La Pellagra, i Pellagrosi e le Amministrazioni Pubbliche*, Milano 1890, pp. 530-531.

1879 and 1881, how little faith can be attached to official figures. The systems of investigation vary in different provinces, and meet with various degrees (and kinds) of opposition in different quarters. Many of the figures have to be estimated, with no great probability of correctness. Balp's tables¹ show that while in some provinces the census gives a mortality of 43 per cent among pellagrous patients, in others the mortality is only 1 per cent. On the assumption that 2½ per cent is the true average mortality, he deduces that the actual number of cases in Lombardy to-day is 23,252.

New cases recorded.—Theoretically this is the best test. Practically it fails for two reasons. No record has been kept of new cases until 1906, in most provinces. Fifteen years from now the lists of new cases will be an accurate index of progress.

There will always remain a flaw in the accuracy of the "new cases" statistics, because of the habit of concealing the disease for years, and revealing it at last in company with a number of friends, who may likewise have been sufferers for indefinite periods. The table of new cases reported by provinces and towns is appended as Table 1; its total worthlessness will be evident at a glance. There was no systematic search for new cases, except in a few provinces, until 1906; and undoubtedly the "new cases" of that year are old cases for the most part. This is doubtless true to a certain extent of 1907. It will be some years before the reports of new cases have accurate representative value. It is probably true, however, that the new cases are limited, as the table would indicate to 7 out of the 13 regions of Italy (and to 41 out of 69 provinces). These 7 regions have a population of 20,159,787. The 4,950 cases of 1907 would thus give 1 new patient for every 4,072 of the population, or 24 per 100,000 inhabitants; but this estimate includes the urban population, as well as several unaffected provinces.

Cases admitted to the insane asylums.—This test would be good if it were everywhere applicable. The insane cases are the severe cases; their decrease is a sign of real progress in combating the disease. But even if the figures for the whole of Italy could be collected they would be misleading. What patients are admitted to asylums depend largely upon the capacity of the asylums. Of late years asylum facilities have greatly increased. Moreover, insanity of a mild type, which was formerly little heeded, is now cured, whenever possible, in institutions for the insane.

Number of deaths.—There are several objections to this test. The chief is the fact that deaths are usually of old patients, and so can not represent present conditions. But the objections are outweighed by the certainty of the figures and the completeness with which they can be collected. Of course no one year is a sufficient period upon which to base conclusions about a disease like pellagra. All that can be deduced from a table like Table 11 is that when for several consecutive years the death rate goes steadily down in a given district, that district is progressing; and when it goes up, or remains stationary, or vacillates, that there is no progress.

Applying these general considerations to Table 11, we notice, in the first place, that Italy as a whole records less than half as many deaths from pellagra in 1907 as in 1888, and only two-fifths as many

¹ *Venticinque Anni*, etc., pp. 7, 8, 9.

if the increase in population is considered. Piedmont is practically free from the disease, except the one province of Alessandria. Lombardy has made great forward strides, especially in the provinces, which were the greatest sufferers. Mantua is perhaps an exception; its progress, at least, has not been so rapid as that of Bergamo, Brescia, Milan, and Cremona. The Sondrio figures for 1888 are hard to explain on the hypothesis that the province had several hundred pellagrous patients 15 years ago.

Venetia has striven to good purpose also. Padua and Rovigo still show heavy mortality, and Verona has not made quite the progress of her sister provinces. But the record as a whole is an occasion for just pride in spite of poverty and its attendants. The death rate has been lowered in 19 years from 44.7 to 18.4 per 100,000 inhabitants. In Emilia the prospect is not so good. Certain provinces, e. g., Piacenza, Modena, and Reggio, have done wonders, but the record of Ferrara and Forlì is less encouraging. From other sources we know that the disease, which is being repressed in its original haunts, is extending to the east and south. Table 11 confirms this fact.

In Tuscany there are signs of great progress since 1888, but of little since 1904; and the Marches and Urbino appear practically stationary. Macciata has a higher death rate than any province except Padua and Rovigo, and Perugia's situation is still unsatisfactory, while Pesaro and Urbino are improving, to all appearance. In the Abruzzo there were no deaths in 1888, because there was no pellagra. The disease came with the general consumption of corn. Whether it will spread, or whether the law of 1902 will be sufficient to check its progress, remains to be seen. In the Campanico, in Apulia, Calabria, and even Sicily and Sardinia, we find a few scattered deaths, although these provinces showed no new cases in Table 1. It is to be hoped that the deaths are of imported cases. What is unfortunately more probable is that the communal authorities have been able to suppress the new cases, but have been obliged to record the deaths.

If we leave statistics and listen to the opinions of experts we shall reach the conclusion that pellagra in Italy is decreasing notably both in numbers and in intensity, but that it is extending its area. The causes of the decrease have been, in the main, the improved conditions of the laboring classes through the diversification of industries, temporary emigration, scientific agriculture, and improved wage contracts; but a part, at least, of the progress is directly attributable to direct measures of prevention and cure.

Pellagra hospitals, sanitary stations, and food distributions have lengthened the life of the pellagra patient and averted the worst forms of the disease. Such preventive measures as desiccating plants and rural kitchens have aided in protecting the peasantry from the scourge. But above all, the prohibition of spoiled corn has had an immense effect upon the public health. What is needed is an extension of the government control to mills and the milling industry. And while all ideas of prohibiting corn, either as a crop or as an article of food, are impracticable, the effort to educate the peasantry in regard to the dangers of spoiled corn and to show him substitutes for the more perilous varieties, as well as for the unwholesome corn loaves, are not vain. In education, even more than in government

control, lies the hope of pellagra's enemies. For a country like the United States, where the rural population is widely educated, it would appear easy to avert an endemia of pellagra by a vigorous campaign of regular instruction.

TABLE 1.—*New cases reported.*

	Total num- ber of com- munes.	Com- munes de- clared pellag- rious.	New cases reported.					Popula- tion 1906.
			1904 (second half).	1905	1906	1907	1908 (first half).	
PIEMONTE.								
Torine.....	442							1,148,612
Cuneo.....	263				4	1		650,842
Novara.....	437		1	1	13	9		769,691
Alessandria.....	343		2	4	15	12		836,062
Total.....	1,485		3	5	32	22		3,405,207
LOMBARDIA.								
Sondrio.....	78	11		1	5	2	1	130,711
Como.....	510	25		1	21	11		606,545
Milano.....	297	102	26	16	269	244		1,513,722
Pavia.....	221	15	2	14	35	35		496,403
Bergamo.....	306	131	1	8	599	304	86	491,265
Brescia.....	280	124	49	57	345	256		554,733
Cremona.....	133	68	26	88	356	116		335,241
Mantova.....	68	51		109	258	94		307,713
Total.....	1,893	527	104	291	1,888	1,062	87	3,700,333
LIGURIA.								
Porto Maurizio.....	106							148,811
Genova.....	195							985,131
Total.....	301							1,133,942
VENETO.								
Belluno.....	66	15	30	91	55	54		206,359
Udine.....	179	83	1	8	185	190		637,103
Treviso.....	96	86	15	226	499	140		442,654
Vicenza.....	123	58	63	29	654	156		468,821
Verona.....	113	60	3	40	195	114		436,612
Padova.....	103	101	58	336	904	793		466,735
Venezia.....	50	38	114	238	635	279		424,503
Rovigo.....	63	38	85	73	84	79		227,729
Total.....	793	479	369	1,041	3,211	1,805		3,476,516
EMILIANA.								
Piacenza.....	47	11	5	25	27	11		248,642
Parma.....	50	5		10	36	90		295,528
Reggio Emilia.....	45	24		6	91	66		282,013
Modena.....	45	12			52	36		325,254
Ferrara.....	16	11		36	219	129		283,046
Bologna.....	61	20	9	36	181	76		530,790
Ravenna.....	18	7			108	49		238,113
Forlì.....	41	30		44	217	177		288,213
Total.....	323	120	14	157	931	634		2,491,599
TOSCANA.								
Massa.....	35	1			3	3		207,304
Lucca.....	24	1	5	10	11	20		331,275
Pisa.....	40	3	9	16	24	17		331,155
Livorno.....	9							129,487
Firenze.....	76	7	3	10	30	20		968,113
Arezzo.....	40	10	84	16	66	18		277,558
Siena.....	37		2	1	3			236,917
Grosseto.....	20					1		149,874
Total.....	281	22	103	53	137	79		2,631,683

PREVALENCE OF PELLAGRA.

TABLE 1.—*New cases reported*—Continued.

	Total number of communes.	Communes declared pellagrous.	New cases reported.					Population 1906.
			1904 (second half).	1905	1906	1907	1908 (first half).	
MARCHE, ETC.								
Pesaro.....	73	21	3	11	25	50	.....	259,708
Ancona.....	51	1	.....	.....	10	5	.....	308,003
Macerata.....	55	20	5	4	152	83	.....	258,109
Ascoli Piceno.....	70	11	1	7	82	28	.....	247,664
Perugia.....	152	33	1,226	1,393	1,405	1,136	.....	681,229
Rome.....	227	6	.....	5	22	21	.....	1,252,258
Total.....	628	92	1,235	1,410	1,696	1,323	.....	3,006,971
ABRUZZI.								
Teramo.....	74	4	1	1	32	25	.....	313,693
Aquila.....	127	.....	.....	.....	.....	.....	.....	399,020
Chieti.....	120	.....	.....	2	.....	.....	.....	371,096
Campobasso.....	133	.....	.....	.....	.....	.....	.....	363,669
Total.....	454	4	1	3	32	25	.....	1,447,478
CAMPANIA.								
Caserta.....	186	.....	.....	.....	.....	.....	.....	788,454
Benevento.....	73	.....	.....	.....	.....	.....	.....	257,161
Avellino.....	128	.....	.....	.....	.....	.....	.....	398,658
Napoli.....	69	.....	.....	.....	.....	.....	.....	1,182,465
Salerno.....	158	.....	.....	.....	.....	.....	.....	561,652
Total.....	614	.....	.....	.....	.....	.....	.....	3,188,390
FUGLIE.								
Foggia.....	53	.....	.....	.....	.....	.....	.....	434,634
Bari.....	53	.....	.....	.....	.....	.....	.....	846,412
Potenza.....	124	.....	.....	.....	.....	.....	.....	474,371
Lecce.....	130	.....	.....	.....	.....	.....	.....	731,492
Total.....	360	.....	.....	.....	.....	.....	.....	2,486,909
CALABRIA.								
Cosenza.....	151	.....	.....	.....	.....	.....	.....	476,169
Catanzaro.....	152	.....	.....	.....	.....	.....	.....	484,345
Reggio.....	106	.....	.....	.....	.....	.....	.....	443,986
Total.....	409	.....	.....	.....	.....	.....	.....	1,404,500
SICILIA.								
Messina.....	97	.....	.....	.....	.....	.....	.....	552,043
Catania.....	63	.....	.....	.....	.....	.....	.....	734,553
Siracusa.....	32	.....	.....	.....	.....	.....	.....	445,539
Caltanissetta.....	28	.....	.....	.....	.....	.....	.....	338,564
Girgenti.....	41	.....	.....	.....	.....	.....	.....	380,485
Trapani.....	20	.....	.....	.....	.....	.....	.....	368,612
Palermo.....	76	.....	.....	.....	.....	.....	.....	772,441
Total.....	357	.....	.....	.....	.....	.....	.....	3,592,237
SARDEGNA.								
Sassari.....	107	.....	.....	.....	.....	.....	.....	324,327
Cagliari.....	257	.....	.....	.....	.....	.....	.....	502,049
Total.....	364	.....	.....	.....	.....	.....	.....	826,376
Grand total.....	8,262	1,244	1,829	3,018	7,927	4,950	.....	33,362,167

TABLE 2.—Deaths from pellagra.

	Actual figures.					Number per 100,000 inhabitants.				
	1888	1904	1905	1906	1907	1888	1904	1905	1906	1907
PIEMONTE.										
Torino.....	39	5	9	5	4	3.7	0.4	0.8	0.4	0.3
Cuneo.....	36	17	11	9	4	5.7	2.7	1.7	1.5	.6
Novara.....	38	18	13	12	7	5.4	2.4	1.7	1.5	.9
Alessandria.....	54	21	17	19	15	7.1	2.5	2.0	2.2	1.8
Total.....	167	61	50	45	30	5.5	1.8	1.5	1.3	.9
LOMBARDIA.										
Sondrio.....	9	12	6	2	8	7.4	9.5	4.6	1.5	6.1
Como.....	59	32	27	22	28	11.0	5.4	4.4	3.6	4.6
Milano.....	271	168	143	107	106	22.1	11.1	9.4	6.4	6.3
Pavia.....	86	48	36	29	33	18.0	9.6	7.2	5.8	6.6
Bergamo.....	173	117	97	93	64	41.8	24.7	19.7	18.9	13.0
Brescia.....	273	158	148	135	101	55.2	28.6	26.6	24.3	18.2
Cremona.....	140	94	80	83	65	45.0	28.2	23.8	24.8	19.4
Mantova.....	76	72	56	61	58	25.2	22.9	18.2	19.8	18.8
Total.....	1,087	701	593	532	463	27.9	15.9	13.4	12.0	10.4
LIGURIA.										
Genoa.....	5	0	2	3	4	.6	.....	.2	.3	.4
VEVETO.										
Belluno.....	44	34	32	37	20	24.4	17.3	15.5	17.9	9.7
Udine.....	237	153	132	102	77	44.5	25.0	20.7	16.0	12.1
Treviso.....	222	117	137	117	83	57.2	27.9	30.9	26.4	19.2
Vicenza.....	208	120	128	85	67	50.3	26.2	28.1	18.1	14.3
Verona.....	101	72	103	77	74	25.0	16.8	23.6	17.6	16.9
Padova.....	268	207	283	185	171	64.9	45.8	60.6	39.6	36.6
Venezia.....	143	69	106	62	48	38.5	16.8	24.9	14.6	11.3
Rovigo.....	108	76	78	73	70	49.3	34.0	43.2	32.0	30.7
Total.....	1,331	848	999	738	610	44.7	27.4	30.2	22.3	18.4
EMILIANA.										
Piacenza.....	101	55	57	49	36	43.3	22.1	22.9	19.7	14.5
Parma.....	100	31	42	27	27	36.2	10.4	14.2	9.1	9.1
Reggio Emilia.....	64	29	32	24	15	25.1	10.3	11.3	8.5	5.3
Modena.....	29	17	10	14	5	9.9	5.3	3.1	4.3	1.5
Ferrara.....	21	49	54	53	50	8.6	17.5	19.1	18.7	17.6
Bologna.....	65	56	39	59	37	13.4	10.4	7.3	11.1	7.0
Ravenna.....	19	13	15	10	4	8.5	5.4	6.3	4.2	1.7
Forlì.....	68	40	36	34	44	26.0	13.9	12.5	11.7	15.2
Total.....	467	290	285	270	218	21.1	11.7	11.4	10.8	8.7
TOSCANA.										
Massa.....	12	3	6	1	3	6.7	1.5	2.9	.5	1.5
Lucca.....	36	16	14	12	13	12.1	4.9	4.2	3.6	3.9
Pisa.....	4	8	5	4	6	1.4	2.4	1.5	1.2	1.8
Florence.....	73	32	32	23	19	8.7	3.3	3.3	2.4	1.9
Arezzo.....	30	16	29	31	14	12.0	5.7	10.4	11.2	5.0
Siena.....	13	19	16	14	10	6.0	7.9	6.7	5.9	4.2
Grosseto.....	1	1	1	.....	1	.8	.7	.6	.....	.6
Total.....	169	95	103	85	66	5.2	2.6	3.9	3.2	2.5
MARCHE, ETC.										
Pesaro.....	62	68	64	55	42	26.5	26.1	24.6	21.2	16.1
Ancona.....	18	18	6	8	5	6.4	5.8	1.9	2.6	1.6
Macerata.....	44	69	73	84	58	17.9	26.2	28.3	32.5	22.4
Ascoli P.....	12	29	21	33	16	5.4	11.5	8.4	13.3	6.4
Perugia.....	108	138	136	141	102	17.9	20.1	20.0	20.7	14.9
Roma.....	8	21	18	20	.....	.8	1.7	1.4	1.6	.....
Total.....	252	343	318	341	223	9.2	11.4	10.5	11.3	7.4
ABRUZZI.										
Teramo.....	.....	14	3	2	6	.....	4.4	.9	.6	1.9
Aquila.....	.....	.....	3	.....	1	.....	.....	.8	.....	.3
Chieti.....	.....	2	.....	2	.....	.....	.5	.....	.7	.....
Campbasso.....	1	.....	1	1	.....	.3	.....	.2	.2	.....
Total.....	1	16	7	5	7	.1	1.1	.4	.3	.4

TABLE 2.—*Deaths from pellagra*—Continued.

	Actual figures.					Number per 100,000 inhabitants.				
	1888	1904	1905	1906	1907	1888	1904	1905	1906	1907
PUGLIE.										
Foggia.....				1	1				0.2	0.2
Bari.....	1	1				0.1	0.1			
Total.....	1	1		1	1	.04	.04		.04	.04
CALABRIA.										
Catanzaro.....					1				.2	.2
Reggio.....				1						
Total.....				1	1				.06	.06
SICILIA.										
Messina.....		1					.2			
Catania.....	2	1		2		.3	.1		.3	
Total.....	2	2		2		.06	.05		.05	
SARDEGNA.										
Sassari.....	1	5				.4	1.6			
Cagliari.....		1					.2			
Total.....	1	6				.1	.7			
Grand total.....	3,482	2,363	2,357	2,023	1,623	11.7	7.1	7.0	6.0	4.8

Milan, Italy, November 2, 1908.

Respectfully submitted.

W. BAYARD CUTTING, Jr.,

Vice and Deputy Consul of the United States.

Approved and respectfully submitted.

JAMES E. DUNNING,

Consul of the United States.

PELLAGRA IN ITALY.

LIST OF ANNEXES.

- A1. Provincia di Sondrio. Quadro dei comuni, con indicazione della rispettiva popolazione legale censita alla mezzanotte dal 9 al 10 febbraio 1901.
- A2. Elenco dei Comuni della Provincia di Como.
- A3. Province of Milan, Pellagra.
- A4. La Provincia di Milano e la Pellagra. Note Cronologico-Statistiche dell'Avvocato Paolo Buzzi.
- A5. Commissione Pellagologica Provinciale, Milano. Relazione concernente il triennio 1905-1906-1907.
- A6. Pavia. Pellagra.
 1. Ministero dell'Interno, Direzione Generale della Sanità-Pubblica. Legge 21 Luglio, 1902, N. 427, e Regolamento 5 novembre, 1903 N. 451, Per La Prevenzione E La Cura Della Pellagra. Roma, 1903.
 2. Ministero dell'Interno, Direzione Generale della Sanità-Pubblica, Roma. Testo Unico delle Leggi Sanitarie, approvato con regio decreto, agosto 1, 1907.
 3. Ministero delle Finanze, Direzione Generale delle Privative, Roma. Norme per la somministrazione gratuita del sale ai pellagrosi poveri.
 4. Dr. G. Antonini. Storia Parlamentare dello stanziamento di 100,000 lire per la cura della Pellagra. Estratto dal Periodico La Rivista Moderna, Firenze.
 5. Relazione dell'andamento della locanda sanitaria di Bagnolo Mella. Stagione Estiva 1893. Del Medico Direttore Ceresoli Dott. Cesare Ceresoli. Brescia.
 6. La Locanda Sanitaria. Conferenza Pubblica Tenuta in Castrezzato dal Cav. Dott. Cesare Ceresoli di B. Mella. Brescia.

7. Dr. Cav. Cesare Ceresoli. La Locanda Sanitaria di Bagnolo Mella. Notizie e considerazioni lette all'Ateneo di Brescia nell'adunanza del 1 aprile 1894.
8. Relazione sul funzionamento della Locanda Sanitaria di Bagnolo Mella (Stazione Estiva 1898) del Medico Direttore Dott. Cav. Cesare Ceresoli.
9. Ceresoli, Dott. Cav. Cesare. Il Pane al Sangue. Notizie e considerazioni lette nell'adunanza del 13 maggio 1900 al R. Ateneo di Brescia.
10. Locanda Sanitaria di Bagnolo Mella. Esercizio 1899. Relazione del Medico Direttore Dott. Cav. Cesare Ceresoli.
11. Esposizione Regionale di Udine 1903. Locanda Sanitaria di Bagnolo Mella. Premiata con Medaglia d'Argento all'Esposizione d'Igiene in Napoli 1900.
12. Commissione Provinciale Pellagologica di Brescia. Relazione Generale sulla alimentazione curativa del 1907.
13. Commissione Pellagologica Provinciale di Bergamo. Prof. Dott. Stefano Balp. Venticinque anni di lotta Contro la pellagra (1881-1908).
14. Il Manicomio Provinciale di Milano in Mombello dal 1879 al 1906.
15. Essicatoi per cereali e bozzoli. Officina di costruzioni meccaniche della Ditta Ing. Pietro Cattaneo e Fratello Angelo in Villa Campeggi di Pavia.
16. Essicatoi fissi o mobili. Estratto dalla Rivista Agraria Polesana 1904. Dott. C. Ceresoli.
17. Sugli Essicatoi da Granoturco. Relazione al Comitato Centrale Italiano contro la Pellagra. Dr. Cav. Uff. Cesare Ceresoli.
18. Terzo Congresso Pellagologico Italiano. Dr. Cesare. Ceresoli. Essicatoi e granai municipali.
19. Esposizione di Brescia 1904. Forno Rurale di Bagnolo Mella.
20. Congresso Agrario Nazionale di Udine, 7-11 settembre 1903. I Provvedimenti contro la pellagra coi rapporti dell'agricoltura. Relazione del Dott. Cav. Uff. Cesare Ceresoli.
21. Ceresoli, Dott. Cav. Uff. Cesare. Le malattie del lavoro. Conferenza popolare tenuta il 14 dicembre 1901 alla Camera del Lavoro di Brescia.
22. Dott. Cav. Uff. Cesare Ceresoli. Sulle alterazioni del mais. Relazione a S. E. il Ministero dell'Interno.
23. Secondo Congresso pellagologico interprovinciale di Bologna. Maggio, 1902. Sul Cambio del Granoturco. Dott. Cav. Cesare Ceresoli.
24. Secondo Congresso Pellagologico Italiano. Bologna, maggio 1902. Il Cambio Guido Baccelli in Bagnolo Mella. Comunicazione del Dott. Cesare Ceresoli.
25. Dott. Ceresoli. Relazione sul Cambio Guido Baccelli per gli esercizi, 1902-1903.
26. Esposizione di Brescia, 1904. Cambio Guido Baccelli di Bagnolo Mella.
27. G. Antonini—V. Tirelli. L'Opera Pellagologica di Cesare Lombroso. Estratto dal Volume: L'Opera di Cesare Lombroso nella scienza e nelle sue applicazioni.
28. Comitato Permanente Interprovinciale per la cura della Pellagra. Dott. Giuseppe Antonini. Istruzioni popolari per la lotta contro la pella.
29. Ministero dell'Interno, Direzione Generale della Sanità-Pubblica. Malattie infettive e diffusive dall'anno 1901 al 1904. Profilassi delle malattie celtiche dal 1902 al 1904.
30. Ministero dell'Interno, Direzione Generale della Sanità-Pubblica. Bolletino Sanitario dell'Anno 1905. Riassunto dei casi di malattie infettive dell'uomo denunziate in ciascuna Provincia, e nel Regno durante l'anno 1905.
31. Ministero dell'Interno, Direzione Generale della Sanità-Pubblica. Malattie infettive dell'uomo denunziate nell'anno 1906. Riassunto dei casi di malattie infettive dell'uomo denunziati in ciascuna Provincia e nel Regno durante l'anno 1906.
32. Casi di pellagra denunziati in ciascuna Provincia del Regno, durante l'anno 1907.
33. Ministero dell'Interno. Morti per pellagra nel Regno negli anni 1905-1906-1907.
34. Lotta contro la pellagra in Italia dal 1904 al 1907 e suoi principali risultati.
35. Pellagra. Dati Statistici per gli anni 1906-1907. Questi dati si riferiscono alle sole Provincie del Regno aventi Comuni dichiarati affetti da endemia pellagrosa.
36. La lotta contro la pellagra in Italia fino al 1907. (Furnished by the Ministero dell'Interno, as well as Annexes 30 to 37.)
37. Elenco dei comuni pei quali fu messo il decreto prefettizio di dichiarazione di endemia pellagrosa, a termini dell'Art. L.81 del testo unico delle leggi sanitarie, approvato col. Ro. Decreto 1° agosto 1907. No.636.
38. Il Pellagrosario. Numero Unico per l'inaugurazione dell'Istituto in Inzago.
39. Four blank Forms of Administration Reports. Asilo dei Pellagrosi in Inzago.
40. Five photographs (two in duplicate) of pellagrous patients, received from Direzione del Manicomio, Provinciale di Milano, in Mobello.
41. See BM. —.

APPENDIX No. 1.

LAW OF JULY 21, 1902, FOR THE PREVENTION AND CURE OF PELLAGRA.

ARTICLE 1. All persons are forbidden to sell, to keep for sale, and to distribute in any form or to anyone:

(a) Indian corn that is immature, not well desiccated, moldy, or spoiled in any other way, whether in the form of grain or of flour.

(b) All products obtained from such flour and those that although prepared with normal and sound flour become subsequently moldy or otherwise spoiled.

ART. 2. All persons are forbidden to introduce into the Kingdom for use as food corn or products of corn that are spoiled or imperfect even if the damage has occurred during the transport or in the warehouses.

ART. 3. The circulation in the Kingdom, the grinding and utilization of spoiled or imperfect Indian corn and its products for other uses than human food, are subject to the authorization of the prefect or of the local authorities, under conditions fixed by special regulations. The lack of such authorization leads to the immediate confiscation of the goods, in addition to the penalties established by law.

ART. 4. Offenses against the three foregoing articles must be reported to the judicial authorities by the officers and agents of the police and shall be punished by a fine of not less than 51 *lire* and not more than 2,000 *lire*. The sanitary officer of the commune as well as the mayor and the provincial doctor shall report directly to the judicial authorities offenses against the present law and the corresponding regulations.

ART. 5. The proceeds of the fines shall go to the benefit of local institutions for the prevention and cure of pellagra.

ART. 6. The sanitary officers and inspectors shall have the right to visit the warehouses of dealers in grain and flour, the workshops of millers, bakers, and pastry cooks, in order to insure the observation of the present law.

ART. 7. Every case of pellagra, even incipient, must be reported in the manner directed by articles 45 and 47 of the law of public health of December 22, 1888, n. 5849.

ART. 8. The communes where endemic pellagra has been certified shall be subjected to the special rules of articles 9 ff. of this law. The declaration of the application of these articles is to be made by decree of the prefect, under the advice of the provincial council of health. The decree goes into effect on the day of notification to the mayor, who is obliged to publish it on the selfsame day.

ART. 9. In the communes declared affected by pellagra, the desiccation, the preservation, and the consumption as food of Indian corn and its products shall be subject to the inspection and direction of the Government and local authorities. The provisional laws for the immediate execution of this and the following articles and the special regulations for enforcing them in a permanent manner shall be approved by the joint provincial administration after hearing the provincial board of health, and also the agrarian committees and other agricultural institutions legally existent in the province.

ART. 10. In those communes that are declared to be infected with pellagra the prefect, after taking the advice of the provincial council of health and, where one exists, the provincial pellagrological commission, may order the construction or acquisition of one or more desiccating machines for Indian corn, or capacity corresponding to the local needs. Their use is to be regulated by the rules prescribed by the regulations for the execution of this law. The prefect may likewise direct the commune to appoint a place where corn, being the private property of inhabitants not possessed of healthy store places, may be kept for them under hygienic conditions, in quantities adequate to the families' needs for private consumption.

ART. 11. The communal council shall make and keep a list of poor "pellagrosi" whose families can not afford to supply them with a curative diet. The provision of curative food for the poor who are suffering from pellagra is obligatory.

ART. 12. The indigent sick, for whom the insufficiency or inefficacy of curative diet has been ascertained, must be taken to institutions, hospitals, or other suitable places.

ART. 13. The expenses accruing from articles 10, 11, and 12 are to be defrayed by—

(a) Private beneficence.

(b) The help of public institutions.

(c) The proceeds of fines (see art. 5).

(d) The aid of the commune and the province, in the proportion of one-half from each.

(e) State subsidies.

The assistance obtained under letters (a) and (b) shall go to diminish the consumer's share of the expense.

ART. 14. In order to assist the local authorities in the application of the present law, provincial and local committees or pellagra commissions may be constituted in the manner decided by the special regulations. To them may be delegated special work for the prevention and cure of pellagra, as well as for the introduction of better agricultural methods.

ART. 15. In the case of refusal or hesitation on the part of any commune in the fulfillment of the obligations imposed by the present law, the prefect shall act with the power delegated to him by the provincial and communal law, with the aid, whenever needful, of the united provincial administration.

ART. 16. In order to bring into effect preventive and curative measures, communes and provinces may unite according to local conditions and mutual convenience.

ART. 17. The sum of 100,000 *lire* is to be put aside annually by the minister of the interior for aid to the communes and for the establishment and support of curative institutions. The same provision is to be made by the minister of agriculture for the encouragement and aid of institutions of an economic nature and for the improvement of agrarian methods.

ART. 18. In communes declared to be infected by pellagra the minister of finance is authorized to have salt distributed gratuitously to the sick poor and to their families in quantity sufficient for their food, as directed by the sanitary officer.

ART. 19. The execution of the present law shall be provided for by regulations approved by royal decree and prepared by the ministers of the interior, of agriculture, and of commerce, with the advice of the superior board of health.

APPENDIX No. 2.

REGULATIONS FOR THE EXECUTION OF THE LAW OF JULY 21, 1902.

ARTICLE 1. Whoever possesses or detains Indian corn or its products that are in the condition described under letters (a) and (b) of article 1 of the law must notify the local prefect or syndic immediately, stating—

- (a) The quantity of the corn or its products.
- (b) The persons to whom it belongs and from whom it was obtained.
- (c) The place in which it is kept.
- (d) The use to which it is to be put.

ART. 2. (Until the permission mentioned in article 3 of the law has been obtained this grain can not be disposed of in any way. The only exception to this rule is with regard to such portions of the corn as is destined for the food of families known to be poor and unable to provide themselves with sound corn.)

ART. 3. Whoever sells, keeps for sale, or distributes in any way bread or food made of wheat flour mixed with Indian corn must inform the public by means of labels written in legible characters and placed in conspicuous places upon the goods.

ART. 4. No Indian corn coming from foreign countries can be passed at the port or the frontier nor allowed to circulate in the Kingdom without having been first declared sound in conformity with the following provisions. An exception is made for shipments to foreign countries to which the usual rules for goods in transit shall be applied.

ART. 5. (A list of experts qualified to test imported corn to be kept in each Province. From this list the prefect appoints an expert for any given test.)

ART. 6. The expert or experts appointed by the prefect shall take, in the presence of the interested parties or of the captain of the ship, and with the help of the custom-house officials, a number of samples proportionate to the size of the cargo. (Methods of taking samples prescribed.)

ART. 7. The above regulations apply also to goods arriving by land; but the taking of samples may be done in one of the internal customhouses, provided the goods travel in shut and sealed cars. Samples must be taken from each car.

ART. 8. (Prescribes the form of certificate to be made out when the samples are taken.)

ART. 9. (The samples taken must be divided into three equal parts. Two of these are to be placed in sealed glass jars, bearing an identification card signed by the inspector and others present at the inspection. The third sample must be used for the summary inspection.)

ART. 10. If on inspection the goods prove undoubtedly sound and fit for food the inspector shall at once give a declaration (certificate) to this effect, and he shall consign to the harbor authorities or to the collector of customs samples sealed in the glass jars. These samples must be kept for at least three weeks in a dry place at the disposition of the sanitary authorities.

ART. 11. (If on examination it appears that the corn is manifestly spoiled the inspector must immediately notify the prefect and, if necessary, the owners. One of the sealed vases must then be sent to the owners, the other to the nearest municipal laboratory or agrarian station, where it must be kept for three months in a dry place. During the few days following the owners may demand that the goods should be tested at the institution or laboratory to which the samples have been sent. If five days elapse without such demand the merchandise shall be definitely adjudged unsound.)

ART. 12. In cases of uncertainty article 11 shall apply, but the inspection must be finished within 10 days of the arrival of the samples.

ART. 14. (Within 10 days of receiving the notice the owners can appeal against the judgment declaring their goods unfit for food and demand a second inspection in State laboratories or some other laboratory indicated by the minister of the interior. The second inspection is final.)

ART. 15. (Until the inspection is completed the goods can not circulate in the Kingdom nor be ground nor used in any way for human food. Under article 14, nevertheless, suspected corn or such as is declared unfit for food can be unloaded in warehouses, provided that it is kept in separate storerooms under the custody of customhouse officials.)

ART. 16. (By admitting the unsoundness of a given cargo the owners can avoid the expense of the test.)

ART. 17. It being ascertained that the merchandise is immature, not properly desiccated, moldy, or in any other way spoiled or imperfect, the owner must notify in writing the prefect or subprefect of the use to which he intends to put it and the place to which he intends to have it sent. The authorities having collected the necessary information may authorize the circulation of the merchandise in the Kingdom and its being ground and used for purposes other than human food upon the following conditions: Indian corn must be directed to a distillery of spirits or a factory of "fecole," and must travel in sealed trucks, which can not be opened except in the presence of customs or police agents. The "bolletta di spedizione" must be given to the authority that has given the permission. Flour must be denatured in the manner determined upon by ministerial regulations. Indian corn that is to be ground must be sent to mills designated by the authorities. The flour must be denatured according to the regulations. The use of Indian corn for the feeding of animals can only be permitted under guaranties that exclude its use as human food.

ART. 21. (Fines imposed in districts free from pellagra shall be used for the benefit of the districts worst infected.)

ART. 22. The report of each case of pellagra must state, in addition to the notices prescribed by the sanitary regulations, how long the person infected has lived in the commune and whether he has been ill before.

ART. 23. (When several cases of pellagra have appeared in persons previously unaffected who have lived at least a year in the commune the prefect shall apply article 8 of the law.)

ART. 24. (While observing the forms established by article 9 of the law, communes may publish special regulations for the prevention and cure of pellagra. The minister of the interior, with the superior board of health, may refuse or annul any regulations contrary to the law or to the general regulations.)

ART. 25. The regulations directed by the above article must be applied immediately in communes declared infected by endemic pellagra without prejudice to other measures that may be ordered by the prefect.

ART. 26. In accordance with article 14 of the law, the inspection of Indian meal, its care and preparation, may be delegated to doctors or other persons of recognized capacity or skill. Corn taken to mills, bread shops, or confectioners shall be inspected with special vigilance.

ART. 27. In communes declared infected with pellagra, where Indian corn known as *quarantino* or *cinquantino* is cultivated, the authorities, assisted by the state, must encourage the cultivation of other cereals, potatoes, etc., in its place.

ART. 28. (The use of communal desiccating plants must be gratuitous for all the inhabitants, and if the plant is available can not be refused under pretext that the grain is the property of persons not belonging to the commune. But in this case compensation must be made not only for the cost of the firing but also for the use of the plant.)

ART. 30. The desiccating in public plants of Indian corn that is obviously spoiled or moldy is not allowed. When such corn belongs to persons notoriously poor it should be, if possible, exchanged for sound corn in sufficient quantity for the needs of the family. Where there are no institutions for this purpose the exchange must be provided for by the commune.

ART. 31. The list of poor "pellagrosi" shall be compiled and kept up to date by the municipal council (meeting). The list must indicate the name, age, sex, and condition of the "pellagrosi" and the families who live with them, and state briefly the provisions made for each "pellagrosi."

ART. 32. Curative food shall be administered in the periods of each year, each period consisting of not less than 40 days. The maximum term for its administration shall be decided by the communal doctor. The diet must be approved by the "pellagrologic" commission or by the provincial doctor. Medicines are included in the curative diet.

ART. 33. In order to be given curative food the patient must present a medical certificate, viséed by the mayor. The food shall be given in sanitary stations, economic kitchens, or similar places, and can only be given at the patients' homes in cases of confinement or advanced pregnancy or when the doctor in charge certifies that the patient can not be moved.

ART. 34. The inefficacy or insufficiency of curative diet, as also the inconvenience of administering it at home, must be certified by the doctor in charge, the medical officer, or the sanitary officer. Upon the receipt of such a certificate the syndic shall issue an order of admittance to a "pellagrosario" hospital or other suitable place.

ART. 39. Provincial or communal pellagra commissions shall be constituted upon the decree of the minister of the interior, together with the ministers of agriculture, industry, and commerce, upon the demand of the provincial or local councils. The provincial doctor, the professor of hygiene at the university, if there is one, the sanitary inspector, and a teacher of an elementary school shall be ex officio members of the commission.

ART. 40. The duties of the commission shall be—

- (a) To care for the matters appointed by the law.
- (b) To administer the funds for curative and prophylactic measures against the disease.
- (c) To inspect and govern the various institutions.
- (d) To call to the attention of the authorities all cases requiring official intervention.
- (e) To encourage improved methods in agriculture.
- (f) To spread among the school children instruction in regard to pellagra, its causes and remedies.
- (g) To compile pellagra statistics.
- (h) And to perform such other duties as shall be assigned to them by competent authorities.

ART. 47. (Methods of distributing free salt.) No family shall be given more than 5 kilograms in one week. The quantity to be given to each individual shall not exceed 8 kilograms per annum for adults of 15 years or over, or 5 kilograms for children.

ARTS. 48, 49. (Punishments for evasion or infringement of provisions of article 47.)



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